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DEFENSE INDUSTRY BULLETIN

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Suggestions from industry representatives concerning possible topics for future issues are welcomed and should be forwarded to the Editor at the address shown below.

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Cover features artist's concept of new F-15 aircraft, designed to give the U. S. Air Force a true air superiority fighter in the 1970s and beyond. Acquisition of the F-15 weapon system is within the mission of the Air Force Systems Command, whose story begins on page 24 of this issue.

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Defense Budget Reassessed—

Secretary Laird's Proposals to Congress . . .

[Editor's Note: The following article is devoted to the statement of the Honorable Melvin R. Laird, Secretary of Defense, before the Senate Armed Services Committee on March 19, 1969, as later revised in his statement before the House Armed Services Committee on April 1, 1969. Secretary Laird's statements reassess the FY 1969 supplemental and FY 1970 defense budget goals enunciated by the previous Administration, proposing generally lower levels of spending for the coming fiscal year. It should be noted that the Secretary of Defense has indicated the possibility of further amendments to the defense budget should continuing review so dictate.]

Mr. Chairman, in my 14 years as a member of the House Subcommittee on Defense Appropriations, I never hesitated to state my views on all important defense issues. In my new role as Secretary of Defense, I, of course, realize the necessity of avoiding preconceptions and of basing my recommendations to the President and the Congress on the circumstances *now* prevailing and on all of the relevant data *now* available to me as Secretary of Defense.

It was in this spirit that Deputy Secretary of Defense David Packard and I undertook the task of reassessing the FY 1969 defense supplemental and the FY 1970 defense budget, prepared by the previous Administration and transmitted to the Congress on Jan. 15, 1969.

Our decision to undertake the major reassessment of the 1969 supplemental and the 1970 budget will not, I hope, be interpreted as a reflection on the work done by our predecessors. . . . We do, of course, differ with them in some respects both in our assessment of the world situation and the relative emphasis which we believe should be given to various elements of the defense program.

Obviously, however, the new team at the Pentagon has not had time since assuming office on January 20 to review all of the programs and activities involved in complete detail nor, obviously, to review all the basic policy objectives and assumptions upon which they were based. We approached our task with two purposes in mind:

- To conduct a comprehensive review of our overall national security policies—political and economic as well as military.
- To initiate only those changes which we felt were urgently required in the FY 1969 defense supplemental and the FY 1970 defense budget, pending completion of our comprehensive review.

Realistically, we felt it was not possible for a brand new Administration to conduct a thorough and effective review of the FY 1970 budget in time for the present session of the Congress to act upon such a budget. The first comprehensive program of the Nixon Administration will, therefore, be reflected in the FY 1971 budget submission next year.

* * * * * * * *

The rationale for the programs proposed by the preceding Administration is set forth in former Secretary of Defense Clifford's annual posture statement, copies of which I understand have been furnished to this Committee. [Editor's note: Statement by former Secretary of Defense Clifford on FY 1970 defense budget and the FY 1970–74 defense program released Jan. 15, 1969, was published in article "Defense Budget Highlights," *Defense Industry Bulletin,* March 1969, page 1.] The changes which I have recommended to the Bureau of the Budget and the President will be summarized in the amendments transmitted to the Congress. My purpose here this morning is to present these changes in greater detail and explain to this Committee why we believe they will improve our overall defense posture in the years ahead. Where we do not now have a sound and sufficient basis for change, we recommend that the January budget requests be permitted to stand. As I mentioned earlier, the FY 1971 budget will be the first Nixon Administration budget, and will be based on the completed reassessment. If, during the next two or three months, our continuing study reveals that additional changes in the FY 1970 budget require urgent Congressional action, we will bring them promptly to your attention.

In making our review for this submission to the Congress and, in our overall assessment, we decided to be guided by the following considerations:

Southeast Asia Requirements.

As long as U.S. military forces are engaged in combat operations in Southeast Asia, their essential needs must be met without exception. Furthermore, we must always be prepared for sudden surges of combat activity, *i.e.,* large-scale Communist offensives. At the same time, we must take fully into account the latest experience data in computing our requirements. These data include activity, consumption and attrition rates; stock levels in Southeast Asia and world-wide; the expansibility of the "going" production base; etc. With the Korean war experience in mind, we must be particularly careful at this stage of the conflict in Southeast Asia to avoid overstocking and to draw down or redistribute any excesses which may have already accumulated.

Non-Southeast Asia General Purpose Force Requirements.

The overriding priority given to the needs of our forces in Southeast Asia during the last three and one-half years has apparently caused some significant distortions in the overall balance of our General Purpose Forces. Although it is highly unlikely that these imbalances can be fully rectified until the conclusion of the conflict in Southeast Asia, we are exploring the possibilities of doing more to correct some of them during the FY 1970 budget period.

Strategic Forces Requirements.

The rapid buildup of Soviet strategic forces during the last two or three years—*e.g.,* intercontinental ballistic missiles, new surface-to-air-missiles and manned interceptors, and the projected increase in submarine-launched ballistic missiles—is a cause for concern with regard to the overall strategic balance between the United States and the Soviet Union. Similarly, Communist China's progress in the development of nuclear armed ballistic missiles may soon pose a new strategic threat to the United States. Accordingly, special attention must be given now to the adequacy of our own strategic offensive and defensive forces, over both the near term and the long term.

Readiness for Production.

Many of the serious problems encountered in the deployment of major weapon systems (delays, cost overruns and failure to meet performance specifications) could probably be avoided if more time were taken to complete development, test and evaluation of the critical subsystems and components. In fact, the tendency to rush into large-scale production before development has been completed may well cost more time and money over the long run, than a more systematic and orderly approach. While each case must be judged on its own merits, taking into account the state of the art and the urgency of the requirement, it would appear that as a general rule we would be better off with more realistic scheduling. Accordingly, each new major weapon systems program reflected in the FY 1969–70 budgets will be reviewed to ensure that the development and production schedules proposed are truly attainable, not only in terms of time, but of cost and performance as well.

Military Pay Reform.

Manpower requirements for the future necessitate the modernization of military compensation to ensure effectiveness and equity to all concerned. Accordingly, we have undertaken a comprehensive review of this complex issue in order to meet this requirement. We have studied the Pay Plan proposed by the previous Administration but, based on our study, we have concluded that much more extensive work is necessary before submitting our recommendation.

Economy and Efficiency.

In view of the potentially dangerous economic and fiscal situation in which the nation now finds itself, all demands on the Federal budget must be matched against a strict set of national priorities. Accordingly, we are searching out every area for potential reductions, including:

- Programs and activities which contribute only marginally to our defense posture must be eliminated.
- While President Nixon supports the previous Administration's request for relief from the civilian personnel reductions imposed by the Revenue and Expenditure Control Act of 1968, he expects each department and agency to hold its civilian employment at the minimum compatible with the efficient conduct of its operations. In this connection, particular attention will be given to overhead activities. The buildup for the Vietnam conflict has been completed and it should now be possible to shake down the organization and eliminate activities which are no longer needed.
- The Defense Department, particularly over the last three years, has accumulated a substantial backlog of needed military construction projects. Several years will be needed to work it off in a reasonable manner. It is, therefore, imperative that all unneeded or marginal installations be closed, or their activities consolidated at other installations.

Scope of National Security Problems

Before I discuss the proposed changes to the FY 1969 supplemental and the FY 1970 budget, I would like to mention briefly the scope of the national security problems which we find ourselves facing as we begin the work of the new Administration.

In view of the major reassessment now in progress by the National Security Council, I will not attempt a comprehensive discussion of our national security problems around the world. Such a discussion must await the results of our own reassessment. I will merely touch on the problems we face to indicate the enormity of the undertaking which confronts the new Administration. Never have the challenges to our national security exceeded in number and gravity those which we found upon taking office.

At the forefront is the war in Vietnam. Along with the war itself, we have inherited a backlog of many years' accumulation of ground rules, operating procedures and unwritten understandings which multiply the complexities. I will say more about Vietnam in just a moment.

Nearby in Laos, Communist forces, including some 40,000 North Vietnamese in addition to the indigenous Pathet Lao, have recently dealt serious setbacks to the Laotian armed forces, and could probably overrun the entire nation at will. Such a development would bring North Vietnamese troops right up to the border of Thailand.

To the north, on the Korean Peninsula, a peace hangs by a slender thread. The North Korean regime, backed by large and well equipped armed forces, still loudly proclaims its aggressive intent with respect to the Republic of Korea in the South. The threats of the regime are underlined by their attempt last year to assassinate the President of the Republic of South Korea, their seizure of the Pueblo which they still hold illegally, and their continued efforts to infiltrate armed bands into the South.

Communist China, nevertheless, still constitutes the most dangerous potential for threatening the peace in Asia. Its vast army and relatively large air and naval forces are now on the verge of being supplemented by an operational nuclear capability, giving Communist China the possibility of being one of our gravest national security problems in the 1970s.

In South Asia, a potential security problem is posed by the withdrawal of United Kingdom military forces from Malaysia/Singapore by the end of 1971. Australia and New Zealand have recognized this problem by announcing their intent to maintain a military force there.

In the Middle East, the almost daily clashes indicate that the Arab-Israeli conflict verges on an active state of war, with the imminent threat of expansion. This situation is complicated by the continuing flow of Soviet Arms to their Arab clients.

In Europe, the extent of our national security problems was put into sharp focus by the Soviet invasion of Czechoslovakia, the speed and efficiency with which the invasion was carried out, and the recent Berlin harassment. Against this backdrop, we must deal with a NATO beset with both military and political problems of no small magnitude.

We are confronted with a marked increase in Soviet strategic weapons capability, both offensive and defensive, a challenge that is of serious import.

There has also been a distinct buildup in Soviet general purpose forces. As you know, the Soviets are increasing their naval capabilities in the Mediterranean and the Indian Ocean, as well as increasing their involvement in Middle East affairs. At the same time, the Russian research and development effort is still going forward at a vigorous pace. All of this is reflected, of course, in the increased military budget of the Soviets.

Complicating all of these problems are serious U.S. and free world balance of payments difficulties; an imbalance in our readiness caused by the war in Vietnam; the increasing competition for resources within the United States; and the threat, if indeed not the actuality, of unsatisfactory price instability.

Vietnam

It is the Vietnam situation that I would like to discuss with the Committee for a few moments, in order to give you a brief report on my observations after my recent trip to that beleaguered country.

Since the last week in February, enemy forces have been engaged in a new offensive in South Vietnam. This has consisted primarily of attacks by fire against American and allied military bases. In addition, there has been a troubling frequency of attacks on the civilian population, including rocket attacks on Saigon, DaNang, and Hue.

From the military standpoint, our military commanders believe the current enemy offensive is destined for failure. Ambassador Bunker, General Abrams, our commanders in the field, and the leaders of the government of the Republic of Vietnam are in unanimous accord that the enemy's efforts will gain no territory permanently, nor will they bring about any lasting reduction in the level of pacification. The recently initiated enemy action has had surprisingly little impact on the morale of the South Vietnamese people and their government. At the same time, however, the enemy's escalation of activity has increased substantially the U.S. and South Vietnamese casualty rates.

While the military leaders in South Vietnam assured me that this offensive can and will be contained, they also conceded the enemy's ability to conduct similar offensives in the future, at least on an intermittent basis. This continued capability on the part of the enemy derives from certain intractable factors in the Vietnamese situation. The forces of Hanoi and the National Liberation Front continue to be supplied with sophisticated equipment and weapons, such as 122mm rockets from Soviet and Communist Chinese resources. In addition, the enemy forces are able to take refuge in sanctuaries across the borders of Laos, Cambodia, and North Vietnam. The Laotian and Cambodian sanctuaries are of great importance in the enemy's ability to withstand our overwhelming superiority in mobility and firepower. Moreover, Cambodia has become increasingly important in the infiltration of supplies and men, and in the command and control of the enemy forces.

The indiscriminate enemy rocket attacks on Saigon, DaNang and Hue are not militarily significant. As of this time, the attacks have added to the degree, but not to the type, of risk to which U.S. forces have for some time been subjected. These attacks, furthermore, have as yet done little to affect adversely the morale of the South Vietnamese public. At the same time, there can be no doubt that the rocket attacks in Saigon, DaNang and

". . . we must greatly increase our effort to improve capabilities of the South Vietnamese armed forces . . ."

Hue are completely inconsistent with the understandings which underlie the bombing halt.

As you will recall, the position of the present Administration on this matter was stated by President Nixon in his press conference on March 4. In reply to a question on how we might respond if these attacks were to continue in South Vietnam, he said:

> **". . . the United States has a number of options that we could exercise to respond. We have several contingency plans that can be put into effect.**
>
> **"I am considering all of those plans. We shall use whatever plan we consider is appropriate to the action on the other side. I will not indicate in advance, and I am not going to indicate publicly, and I am not going to threaten—I don't think that would be helpful—that we are going to start bombing the North or anything else.**
>
> **"I will only indicate that we will not tolerate a continuation of this kind of attack without some response that will be appropriate."**

In addition to containing the current enemy offensive, allied military efforts are reported to be making steady progress. For example, during my recent trip to Vietnam, both General Cushman and General Stilwell cited significant advances in I Corps in eliminating enemy influence, including the Viet Cong infrastructure (VCI). General Cushman, however, informed me that an additional two years would be required before he could see the situation as being satisfactorily in hand. It is apparent that a successful anti-infrastructure effort will, thus, require a substantially higher enemy rate of attrition than has yet been realized.

Militarily, I was assured by our military commanders that the situation in III Corps is under control. General Abrams believes his tactics and precautions have greatly reduced the risks of significant enemy incursion into the capital city of Saigon. The mortar and rocket attacks have been relatively infrequent and unimpressive in number. In the IV Corps area as well, the military situation is steadily moving in a direction favorable to the government of the Republic of Vietnam and the United States. However, Major General Eckhart, the senior U.S. Military Adviser in IV Corps, recognizes that the pacification effort is proceeding slowly in this traditional Viet Cong stronghold.

The basic problem remains that of achieving permanent South Vietnamese governmental control over the country. Although Ambassador Bunker gives persuasive documentation of steady political growth by the government of South Vietnam, this progress is difficult to translate into nationwide security. Even greater national exertion will be necessary to bring administration and political structures of the government of the Republic of Vietnam into the villages and hamlets of South Vietnam. This would be an extremely difficult task under peaceful circumstances; it is monumental while hostilities continue at the present level.

Readiness and Progress of Republic of Vietnam Armed Forces

The regular, irregular and police forces of South Vietnam now include over one million men. The arms and equipment furnished by the United States have increased both in quantity and quality.

I regret to report, however, that I see no indication that we presently have a program adequate to bring about a significant reduction in the U.S. military contribution in South Vietnam. The current operating assumption, as stated to me, is that even the currently funded modernization program for the South Vietnamese forces will equip the South Vietnamese forces only to withstand the Viet Cong insurgents that would remain, after all North Vietnam forces had been withdrawn to North Vietnam. Also, the presentation given to me by the staff of the Military Advisory Command, Vietnam, (MACV) was based on the premise that no reduction in U.S. personnel would be possible in the absence of total withdrawal of North Vietnamese troops. Our orientation seems to have been more on operations than on assisting the South Vietnamese to acquire the means to defend themselves.

About a year ago, the government of South Vietnam undertook a general mobilization to expand the armed forces to more than 800,000 by the end of FY 1969 and, in connection therewith, the U.S. Government assumed the task of equipping those additional forces and modernizing the existing forces so that they could begin to take over more of the combat burden.

The overall modernization program was divided into two phases: Phase I called for the maximum possible indigenous land forces combat capability, assuming continued U.S. participation in the war at the then current level; Phase II called for the development of indigenous forces, which would be capable of suppressing insurgency on their own if North Vietnamese and U.S. forces were withdrawn.

Including the budget request transmitted to the Congress in January, a total of about $1.1 billion has been programmed for Phase I ($532 million in the FY 1970 budget, $351 million in the FY 1969 supplemental, $139 million reprogrammed from available FY 1969 funds, and $65 million in the FY 1968 supplemental). About $800 million of the Phase I funds are earmarked for procurement—about $600 million for tracked combat vehicles, trucks, weapons and ammunition; and most of the remainder, about $160 million, for aircraft. About $300 million is earmarked for operations and maintenance support of the South Vietnamese forces—general supplies and spare parts, training, operations, etc.

No funds were included in the January budget request for Phase II because, I am informed, the requirements had not yet been defined. However, on the basis of my discussions with Ambassador Bunker and General Abrams during my recent visit to South Vietnam, and on the basis of the preliminary reassessment of our overall needs and requirements, I have come to the conclusion that we ought to at least start Phase II this year. I am doing so, however, solely on the basis that this would permit us to begin the process of replacing American combat forces with South Vietnamese military and para-military personnel that are better trained, better led, and better armed than heretofore.

I do not wish to mislead this Committee on what I am talking about here. I am not talking about the withdrawal of American troops at the present time. As President Nixon said in answer to a question at his press conference on March 14:

> **". . . in view of the current offensive on the part of the North Vietnamese and the Vietcong, there is no prospect for a reduction of American forces in the foreseeable future.**
>
> **"When we are able to reduce forces as the result of a combination of circumstances—the ability of the South Vietnamese to defend themselves in areas where we now are defending them, the progress of the talks in Paris, or the level of enemy activity—when that occurs, I will make an announcement. But at this time there is no foreseeable prospect in that field."**

Therefore, the change I am talking about represents not only increased funding for modernization of the armed forces of South Vietnam; it also represents the establishment of a new objective for this modernization which has not previously existed, namely, the effective assumption by the Republic of Vietnam armed forces of a larger share of combat operations from American forces. Frankly, while it may be difficult to carry out U.S. force reductions until South Vietnamese forces are capable of replacing the forces that we reduce or withdraw, we must greatly increase our efforts to improve capabilities of the South Vietnamese armed forces, and to work toward a situation in which U.S. forces can, in fact, be withdrawn in substantial numbers.

Accordingly, we propose to add approximately $36 million in FY 1969 and approximately $120 million in FY 1970 for this purpose. About $26 million of the FY 1969 funds and $75 million of the FY 1970 funds would be used to procure equipment for the South Vietnamese ground forces—armored carriers, trucks, trailers, radios and night vision devices, etc. The remaining $10 million of the FY 1969 funds and $23 million of the FY 1970 funds would be used for training, general supplies and spare parts, transportation, and depot operations associated with the major end items to be provided. About $20 million of the FY 1970 funds would be used to prepare the South Vietnamese air force to operate more advanced aircraft. A small amount, about $2 million, would be used for the modernization of the South Vietnamese navy—for the overhaul and operation of a few U.S. vessels to be turned over to them.

Proposed Adjustments to the FY 1969 Supplemental and FY 1970 Budget

Our recommended changes to the FY 1969 supplemental and FY 1970 budget requests, transmitted to the Congress by the preceding Administration in January, are summarized by general category in Table 1 attached to this statement. [Financial tables referred to in Secretary Laird's statement appear on pages 16 to 19 of this issue.] The original and revised budget estimates are shown by appropriation account in the next two tables—the FY 1969 supplemental in Table 2 and the FY 1970 budget in Table 3. The original and revised amounts requested for authorization in FY 1970 are shown in Table 4. (No further changes are requested in the FY 1969 authorizations, as revised in January 1969.)

The net change in New Obligational Authority is minus $141 million in FY 1969 and minus $3,103 million in FY 1970, for a total net reduction of about $3,244 million in the two years. The net change in the amounts requested for authorization in FY 1970 is minus $1,188 million.

Total Defense Department Outlays are now estimated at $78.4 billion in FY 1969 (the same as in the January budget) and $77.9 billion in FY 1970 ($1.1 billion less than in the January budget). I should point out, however, that our review to date has already revealed a deficit of several hundred million dollars in the Navy shipbuilding and conversion program, and additional deficits in other major programs. I will have more to say on this later.

I should also point out that neither the original nor revised estimates of New Obligational Authority and Outlays include the cost of the pay increases which will go into effect under existing legislation. The total cost to the FY 1970 budget of the new pay increases already authorized under existing legislation is estimated at $2.5 billion—$1.8 billion for military and $0.7 billion for civilian personnel.

Provision for these pay increases has been made in the government-wide "Allowances for Contingencies" account.

One final point before turning to our proposed changes to the FY 1969 supplemental and the FY 1970 budget. As you know, President Nixon had not finally approved the government-wide budget changes as of the time I submitted this statement to you.

However, realizing the urgency of this Committee's time requirements, I requested and received permission to present the Defense Department changes to you in advance of final approval of the overall budget. Accordingly, I must point out that the requested program changes and figures, which I am discussing today, are subject to modification by the Bureau of the Budget and the President until the government-wide budget is finally approved.

Strategic Forces

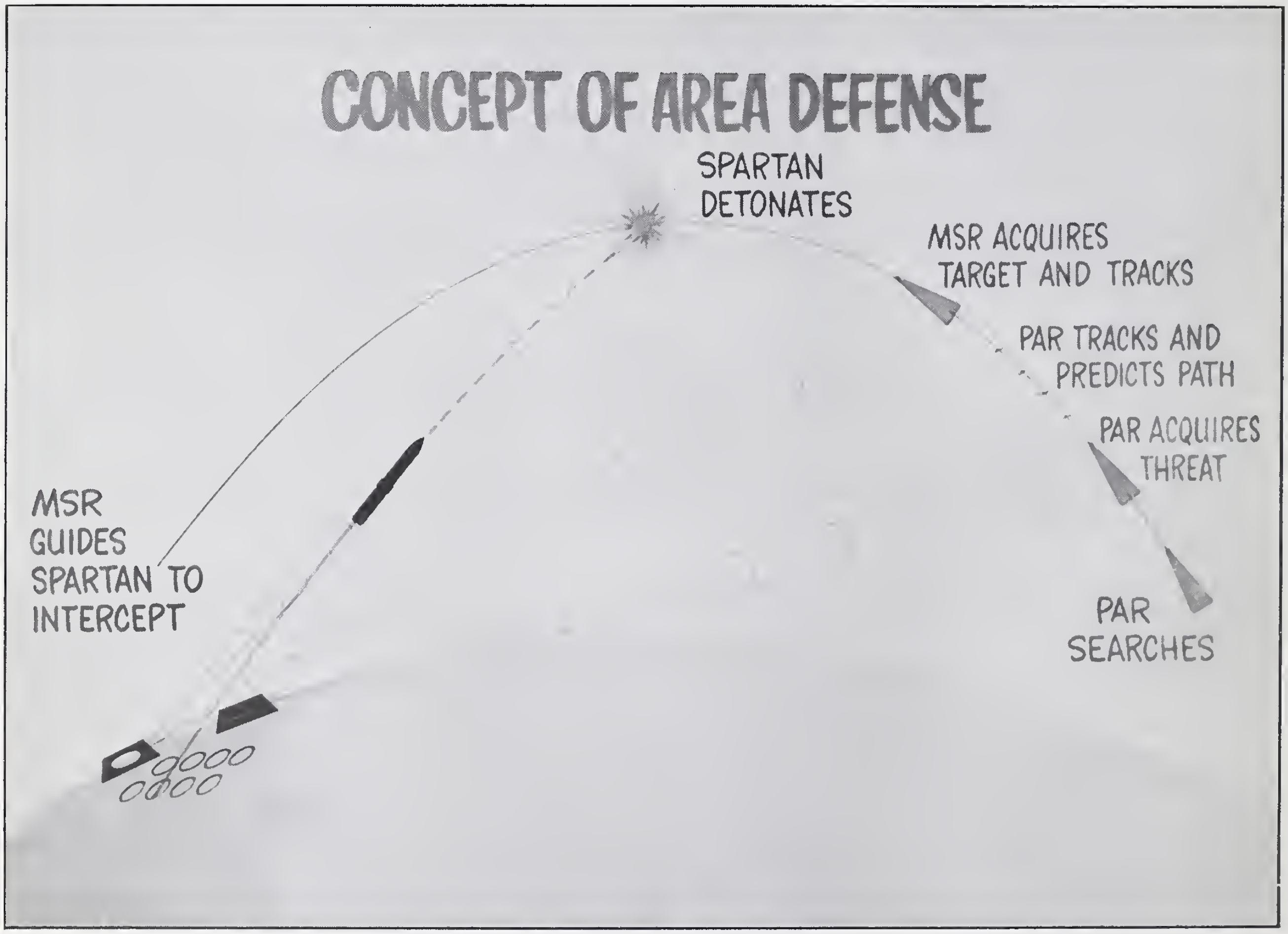
The first item on Table 1 is the Sentinel (now Safeguard) program. President Nixon on March 14 explained the reasons why we have reached the conclusion that we must go ahead with the development and deployment of a ballistic missile defense system. He pointed out that the system now being proposed is based on a different concept than the Sentinel system approved by the preceding Administration. The modified anti-ballistic missile (ABM) system has been designed so that its defensive intent is unmistakable. Moreover, it will be deployed in a manner clearly related to the emerging threat, rather than on the basis of some fixed schedule based on theoretical assumptions.

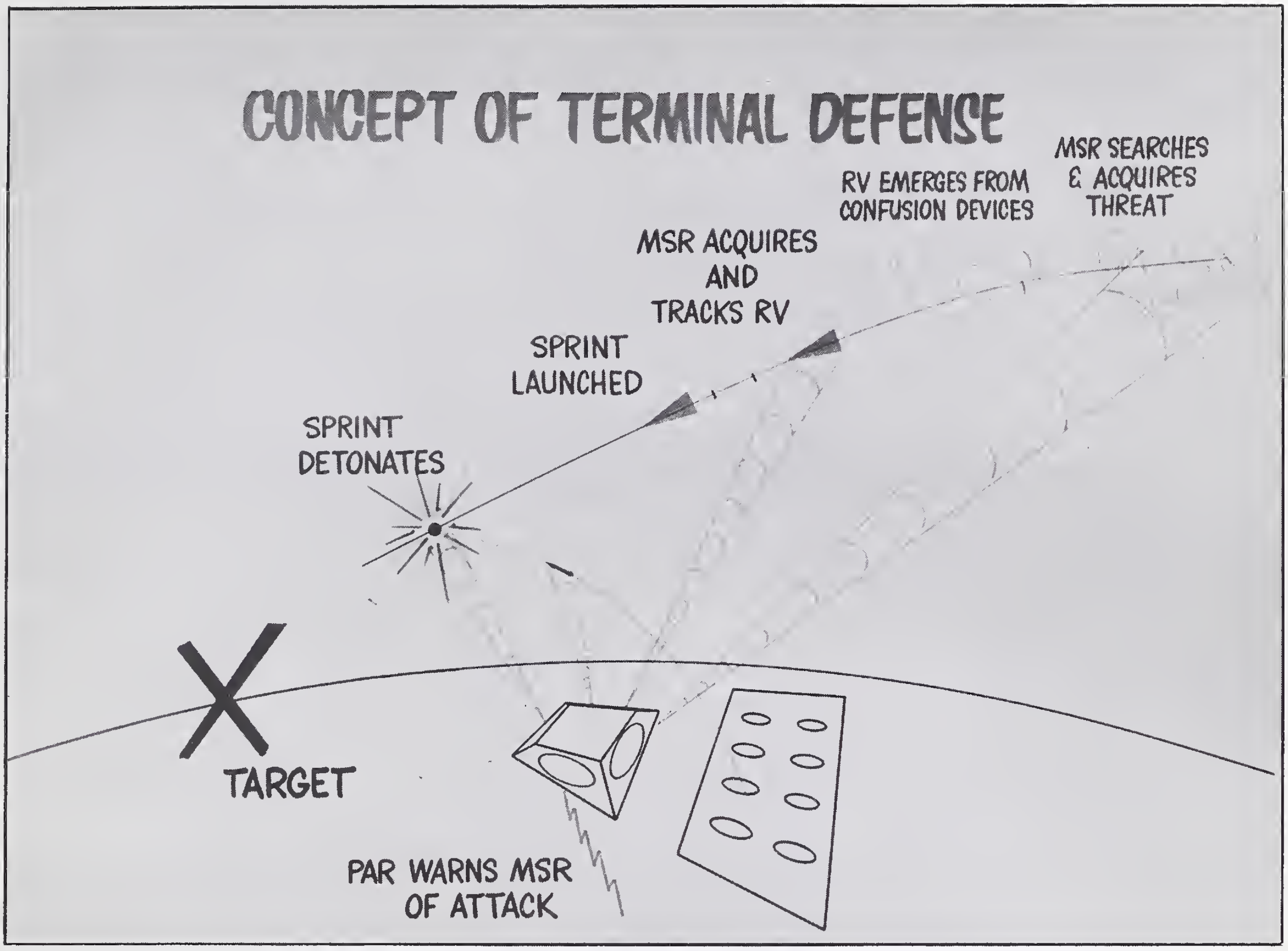
In reviewing this program, we examined all of the major alternatives:

- A deployment which would defend U.S. cities against a Soviet attack.
- No deployment at all, but a continuation of research and development.
- The continuation of the Sentinel program approved by the preceding Administration.
- The deployment of a modified system which would fulfill three objectives: defense of our land-based strategic offensive forces against a first strike by the Soviet Union; protection of the American people against the kind of nuclear attack which Communist China is likely to be able to mount within the decade; and defense of the nation against an accidental or small attack from any source.

Alternative 1.

We rejected the first alternative, not because we do not want to provide complete protection for the American people against a major Soviet attack, but rather because it is not now in our power to do so. The heaviest defense system we considered in our review, one designed to protect our major cities, could still not prevent a catastrophic level of U.S. fatalities


CONCEPT OF AREA DEFENSE
SPARTAN DETONATES
MSR ACQUIRES TARGET AND TRACKS
PAR TRACKS AND PREDICTS PATH
PAR ACQUIRES THREAT
PAR SEARCHES
MSR GUIDES SPARTAN TO INTERCEPT


CONCEPT OF TERMINAL DEFENSE
MSR SEARCHES & ACQUIRES THREAT
RV EMERGES FROM CONFUSION DEVICES
MSR ACQUIRES AND TRACKS RV
SPRINT LAUNCHED
SPRINT DETONATES
TARGET
PAR WARNS MSR OF ATTACK

in the event of a deliberate all-out Soviet attack. And, such a deployment might look like the prelude to an offensive strategy designed to undercut the Soviet deterrent.

Alternative 2.

We rejected the second alternative (no deployment) because it left us with no option to provide defense for our deterrent on the schedule that might be required by the Soviet threat, if we do not reach an agreement with the Soviets on limiting strategic forces. The Soviet Union is increasing its offensive forces at a considerably faster rate than was envisaged in 1967, when the decision to deploy Sentinel was made.

As you will recall, former Secretary of Defense Clark Clifford, in his posture statement in January, pointed out that in a period of a little more than two years the Soviets had increased their number of operational ICBM launchers more than threefold, from 250 in mid-1966 to 896 by Sept. 1, 1968. As of today, the Soviets have in-being and under construction more ICBM launchers than the 1,048 possessed by the United States.

Moreover, the Chinese threat against our population, as well as the danger of an accidental or small attack from some other source, cannot be ignored. Since it is within our power to reduce U.S. fatalities to a minimum level, or to prevent them altogether in the event of Chinese attacks or small attacks from other nations, we must act to do so.

Alternative 3.

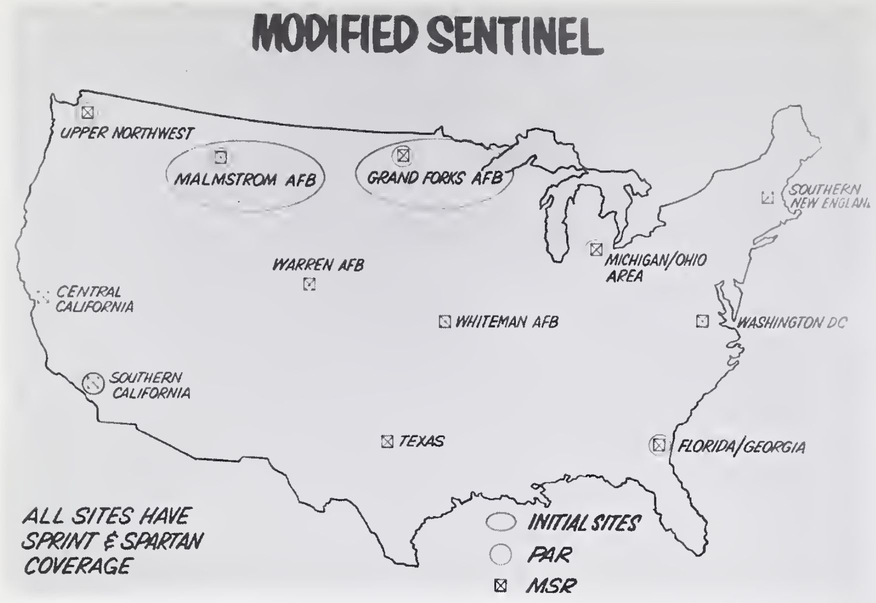
We rejected the third alternative (deployment of the Sentinel system approved by the preceding Administration) because it would not provide sufficient protection against the emerging Soviet threat to our strategic offensive forces. These emerging threats include the rapid buildup in the Soviet submarine-launched ballistic missile (SLBM) force, their development of a Fractional Orbit Bombardment System (FOBS), and their likely deployment of large ICBMs with multiple warheads. Also, the original Sentinel plan could be misinterpreted as—and could, in fact, have been—a first step towards the construction of a heavy system for the defense of our cities.

Alternative 4.

I believe we can all agree that our nuclear deterrent must be made as secure as is technically and economically feasible. Our nuclear forces defend not only ourselves, but our allies. Accordingly, we must take whatever steps are practicable to ensure that our strategic retaliatory forces can survive a Soviet attack.

After examining the available alternatives, we have concluded that a combination of approaches provides the most realistic means of safeguarding our retaliatory capability.

This combination consists of beginning a measured deployment of an active defense of our retaliatory



forces, structured to expand as circumstances may dictate, and preserving the option, if we later find it necessary, to harden further our land-based missiles. The combination is necessary because our studies show that hardening alone would not provide adequate protection against foreseeable advances in the accuracy of Soviet missiles.

The ABM defense system we now propose to deploy will use components previously developed for Sentinel. However, these components will be deployed in such a way as to provide:

- A local defense of the Minuteman missile silos.
- Early warning and area defense of our bomber bases and command and control system.
- A defense of the continental United States against the kind of attack which the Chinese Communists may be able to launch in the mid-1970s.
- Protection against an accidental or small attack from any source.

This system will not require the emplacement of missiles or radars in or near our major cities, except for the protection of the National Command Authorities in Washington, D. C.

Our current plan includes a total of 14 sites, compared with 17 sites in the previous plan. Twelve of the sites are in the continental United States. The other two, Alaska and Hawaii, have been included as an option. The Chicago, New York, and Salt Lake City sites have been eliminated. Thus far, only the first two sites—Grand Forks AFB, N.D., and Malmstrom AFB, Mont.—have been approved for deployment, each with one 4-face Missile Site Radar (MSR), one 1-face Perimeter Acquisition Radar (PAR), Standard Spartans and Sprints. The schedule on which the remaining sites will be deployed will be determined year by year in step with the emergence of the threat.

The new system, if fully deployed (not including the option for Alaska and Hawaii), would provide 12 MSRs with 48 faces instead of 17 MSRs with 38 faces; and 7 PARs with 11 faces instead of 6 PARs with 6 faces. The increase in PAR capability is required to provide all-around radar coverage of the United States, including the seaward approaches. The latter is particularly important for the defense of our deterrent forces against the Soviet SLBM threat. Our present early warning systems do not provide adequate coverage of the seaward approaches and our alert bombers may be caught on their bases by a surprise SLBM attack. Furthermore, the Soviets may configure their SLBMs for depressed trajectory launch. In that case, the total time to target might be considerably less than the 15 minutes required for a normal high trajectory launch. Since our alert bomber forces require 15 minutes from warning to get off their bases, we must also be able to intercept at least the first salvo of SLBMs, and this the proposed new system is designed to do.

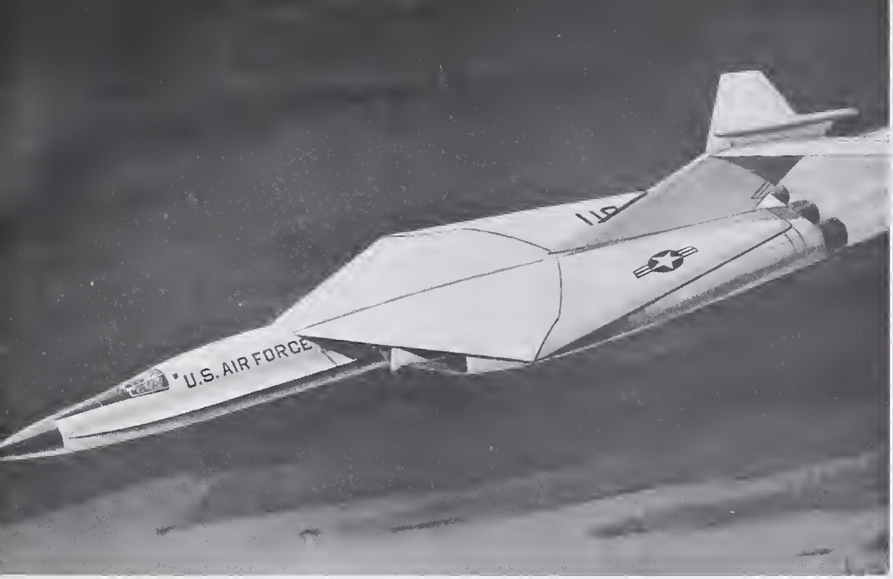
An improved, longer-range Spartan is now under development. If we later find that this missile promises sufficient advantage to warrant proceeding further, we will substitute some Improved Spartans for the Standard Spartan. The longer-range Spartan would give us better coverage of the entire continental United States.

All of the ABM sites would be equipped with some Sprints. The four sites to be located in the Minuteman fields (Grand Forks AFB, N.D.; Malmstrom AFB, Mont.; Whiteman AFB, Mo.; and Warren AFB, Wyo.) would have a considerably larger number than the others.

In summary, the proposed system would work as follows:

- The Spartan batteries at each of the 12 locations would provide area protection against the early Chinese Communist ICBM threat.
- The PARs would provide surveillance and tracking against ICBMs, FOBS and SLBMs.
- The PARs and MSRs would give extra warning, and the Spartans and Sprints some extra protection to the alert bomber force.
- The system as a whole would protect the ABM sites, themselves, and some of the bomber bases against a FOBS attack.
- The four ABM sites, located in the Minuteman fields, would provide some initial protection (and the option for additional protection) to a portion of our Minuteman force.
- The site at Washington, D. C., would give protection to the National Command Authorities against a moderately heavy attack.

The investment cost (procurement and construction) of the new system, if fully deployed, would range from $6 billion to a little over $7 billion, depending on the options that are exercised. This is somewhat more than the cost estimates of the Sentinel system proposed by the preceding Administration. The modified system, however, provides additional capabilities. Because the new system would be deployed at a much more deliberate pace, budgetary requirements in FY 1970 will be about one-half that proposed in the original budget—about $900 million compared with about $1.8 billion. As shown on Table 1, the total reduction in Obligational Authority for FY 1969–70



With an increase in funds for the AMSA design phase, engineering development should begin in FY 1970.

amounts to almost $1 billion. All but $3 million (for Operation and Maintenance) of this total can be applied to reduce the FY 1970 New Obligational Authority required.

The next item, a reduction of $34 million in Nike-X Advanced Development, reflects a deferral of work on a new type of radar. This is a lower priority effort which will just have to be delayed another year to help reduce FY 1970 expenditures.

The third item on Table 1 is the FB–111. As you are well aware, the choice of this aircraft as a strategic bomber was subject to question from the very beginning of the program. Now, more than three years after the decision was made to produce and deploy the FB–111, we find that both the aircraft and its Short Range Attack Missile (SRAM) are still experiencing development and production difficulties, and the cost per aircraft continues to mount. Three years ago the investment cost for a force of 14 operational squadrons (210 unit equipment aircraft) was estimated at $1.9 billion, excluding SRAM. Last January, for reasons explained by Secretary Clifford in his FY 1970 posture statement, the decision was made to reduce the program to 6 operational squadrons (90 unit equipment) with an estimated cost of $1.8 billion, excluding SRAM.

In other words, revised estimates by the previous Administration show that 6 squadrons of FB–111s would cost approximately the same as the cost of 14 squadrons under original estimates.

Now, after a very careful review of the program, we have decided to cut off the FB–111 program at four squadrons (to salvage what we can of the work in process) and concentrate our efforts on the development of a new strategic bomber, the Advanced Manned Strategic Aircraft (AMSA). The FB–111 will not meet the requirements for a true intercontinental bomber, and the cost per unit has reached a point where an AMSA must be considered to fill the void.

Accordingly, the FY 1969 buy of FB–111s can be reduced (with a saving of $107 million), and the planned FY 1970 buy can be eliminated altogether (with a saving of $321 million). The first squadrons of FB–111s will be delivered on the same schedule as planned in the original FY 1970 budget.

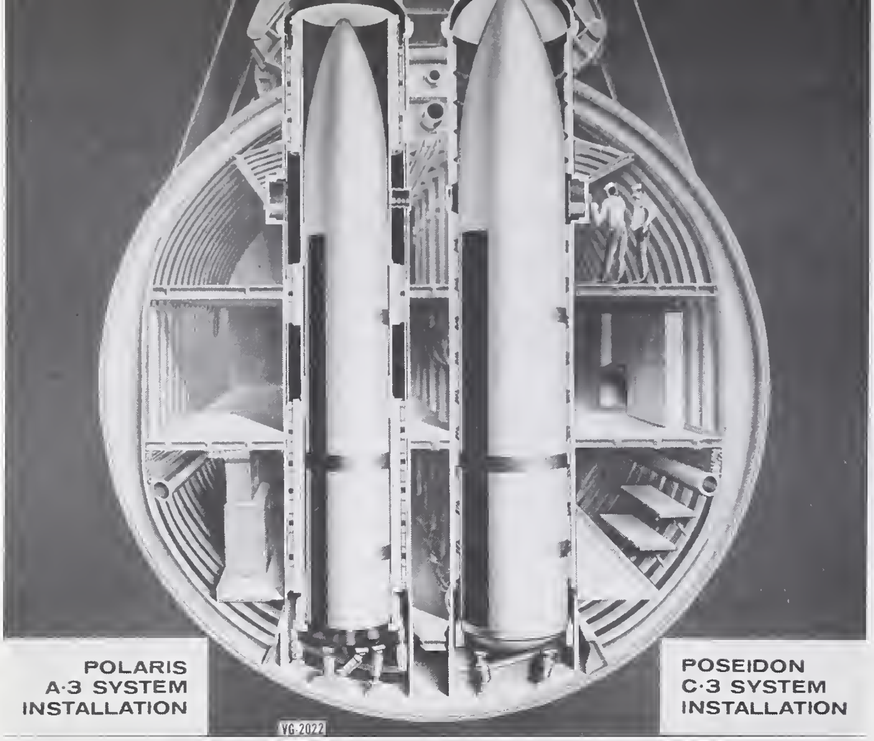
With regard to AMSA, the original FY 1970 budget provided a total of $77.2 million to continue the competitive design phase (*i.e.*, engineering drawings, wind tunnel testing, and mockups) initiated with FY 1969 funds, and to advance the development of the long lead-time avionics and propulsion systems. We now propose to increase that amount by $23 million to shorten the competitive design phase and permit the start of full scale engineering development in FY 1970. With the new design proposals in hand, we should be able to resolve, once and for all, the longstanding controversy over the configuration of AMSA. While no decision on production and deployment need be made now, the accelerated research and development effort could advance the initial operational capability (IOC) of this aircraft by one year, from 1978 to 1977.

The net reduction of $326 million shown for SRAM is the aggregate of four changes—three reductions and one addition. All of these changes are related to the difficulties encountered in the development of SRAM. We have now reached the conclusion that procurement of operational missiles should be deferred until the test program conclusively demonstrates that they will work as intended.

Accordingly, we have deleted most of the missile procurement funds from the budget ($42.2 million in FY 1969 and $110.8 in FY 1970, for a total of $153 million). Inasmuch as we do not know when operational missiles will be available, we have also deferred all special SRAM modification work on the B–52 and FB–111s. The reduction in B–52 SRAM modifications amounts to $37.7 million in FY 1969 and $102.6 million in FY 1970, for a total of $140.3 million. The reduction in FB–111 SRAM modifications amounts to $49.7 million in FY 1969. (As I noted earlier, the last procurement of FB–111s will be made in FY 1969.) Because procurement of the SRAM missile has been deferred beyond FY 1970, the research and development program will have to absorb a greater portion of the overhead cost. Therefore, $17 million has been added to the FY 1970 program for this purpose.

The reduction in Minuteman funding of about $160 million in FY 1970, shown on Table 1, is the aggregate of three separate changes.

The first, and most important, is a slowdown in the development of Minuteman III. While we are confident that the Minuteman III will perform as intended, we believe it would be prudent to reduce somewhat the previously planned deployment rate, at least through the FY 1970 procurement lead time. This delay would serve to reduce the amount of overlapping of research and development and production, and provide more time for testing. In connection with



An increase of $12.4 million is requested for development of an improved guidance system for the Poseidon missile.

the latter, we plan to accelerate the beginning of operational testing by about two months to help ensure that the missile is working well before we return to the originally planned rate in FY 1971. This reflects our determination to minimize cost overruns resulting from research and development modifications after production has commenced. By continuing the originally planned rate through FY 1972 and FY 1973, we could be back on the previous deployment schedule by the end of FY 1974.

Accordingly, we plan to hold Minuteman III production at a lower rate through the FY 1970 funding period, increasing to a higher rate in FY 1971 if all goes well. This will permit a reduction of $135 million in the FY 1970 budget request.

To compensate for the slower deployment of Minuteman IIIs, additional numbers of Minuteman I will be retained in the force. Consequently, the last of the Minuteman I force will be phased out in FY 1974, instead of FY 1973. The Minuteman II deployment plan is unchanged.

The second adjustment concerns the rate of development of the Minuteman Integrated Command and Control System (MICCS). The principal purpose of this system is the integration of Minuteman and ABM command and control. Inasmuch as the ABM program has been modified, the scheduled development of the MICCS can be stretched out. We propose, therefore, to reduce the FY 1970 program by $16 million, from $36 million to $20 million.

The third adjustment is related to some minor construction work at 200 Minuteman silos. About $6 million was included in the original FY 1970 budget to correct potential electrical system and water seepage problems at those silos, because similar problems had been encountered elsewhere in the force. Tests conducted at two of these silos (subsequent to the submission of the FY 1970 budget) indicates that these problems have not materialized and that the work is no longer required.

The increase of $12.4 million for the development of an improved guidance system for the Poseidon missile will advance the initial operating capability (IOC) of that system by about six months. This development was started in FY 1968. The IOC, however, was slipped by about one year in connection with the FY 1969 expenditure reduction effort, and the level of funding provided in the original FY 1970 budget ($33.5 million) would have slipped it further. This is an important program since it promises to improve significantly the accuracy of the Poseidon missile, thus enhancing its effectiveness against hard targets.

The next item in the strategic forces category is an addition of $43 million for the Satellite Early Warning System. This system promises a very good early warning capability against SLBMs and FOBS, as well as ICBMs, whether launched from the Soviet Union, mainland China, or other countries. In addition, it could also contribute to the effectiveness of the ABM system.

The original FY 1970 budget included $63 million for the development of the system, plus about $51 million for procurement, construction and operating costs. We now propose to add $11 million to the development program in order to accelerate work on improved reliability, communications, and sensitivity. We also propose to add $32 million to expand the coverage of the system. This expanded coverage is particularly important in relation to the Soviet SLBM threat.

The reduction of $15 million shown for the Airborne Warning and Control System (AWACS) represents a modest stretch out of this air defense program, particularly with regard to the initiation of engineering development. About $40 million is available for this program in FY 1969 and an additional $75 million was included in the original FY 1970 budget. The reduction of $15 million would thus leave $60 million for FY 1970, which should be enough to keep the program moving at an acceptable level until actual flight tests have demonstrated a usable radar detection and tracking system.

Southeast Asia Items

The next group of items shown on Table 1 is related to the conflict in Southeast Asia.

The increase of $25 million in FY 1969 and $77 million in FY 1970, requested for B–52 sorties, is required to support the additional flying time associated with the maintenance of the current high monthly rate through June 1970. The original FY 1970 budget was based on a lesser number of sorties per month beginning in January 1969. We have actually been flying the current high rate since March 1968, and General Abrams has strongly recommended that this rate be continued. As you know, he considers the B–52 to be one of his most important weapons. As much as I would like to support his recommendation, the budget stringencies under which we must operate in FY 1970 will not permit a continuation of that rate beyond June 1969; and even this extension will require an increase of $25.1 million in FY 1969. Moreover, we have found that the original FY 1970 budget did not provide sufficient funds to maintain even the reduced rate through 30 June 1970, and another $27.4 million will be required for this purpose. I feel very strongly that we must be able to support at least this reduced rate of B–52 sorties throughout the next fiscal year.

The next item has to do with ground munitions. To be perfectly frank, I think the consumption rates for Southeast Asia are based on rather optimistic assumptions, particularly in view of the current Tet offensive. As you will see, however, we are keeping production at a very high rate throughout CY 1969. Should the Congress approve the reduction I am about to discuss, I assure the Committee that I will keep a close watch on actual consumption rates as we get further into the year.

The $460 million reduction shown in FY 1970 for ground munitions reflects the recent downward trend in consumption in Southeast Asia. The original FY 1970 budget projected consumption at 105,000 tons per month through December 1970. Consumption in January of this year was 96,000 tons, and the assumption is made that it will continue to decline over the next year or so. For budget planning purposes, we have assumed that consumption will average about 92,000 tons per month during the July 1969-March 1970 period, and then decline to 87,000 tons per month during the April 1970-December 1970 period.

Production of ground ammunition is now running at about 145,000 tons per month, and we plan to maintain that rate through December 1969. Beginning in January 1970—if the foregoing estimates of consumption are borne out, we plan to reduce production to about 75,000 tons per month and maintain that rate through December 1970 (the end of the FY 1970 procurement lead time). Since projected consumption will exceed planned production in CY 1970, our world-wide inventory of ground munitions is expected to decline by about 160,000 tons by December 1970. However, the very substantial inventory we will have built up through December 1969 would provide an additional hedge should ground ammunition consumption suddenly increase during the next year or so.

Since we are now projecting a decrease in ground ammunition consumption in FY 1970, we can also reduce the funds requested for the transportation of ammunition by about $34 million, as shown in the next item on Table 1.

The reductions shown for air munitions, $89.5 million in FY 1969 and $422.4 million in FY 1970, are based on a somewhat different premise than in the case of ground munitions. The original FY 1970 budget projected both consumption and production of air munitions at 110,000 tons per month from January 1969 through December 1970 (the end of the FY 1970 procurement lead time). Included in the projected consumption rate were the lower number of B–52 sorties.

Actual consumption is now running at about 130,000 tons per month (including the higher number of B–52 sorties), and we have maintained production at about that same rate. Since we see no indication that consumption will decline during the next 12–18 months, we believe it would be prudent to maintain production at about a rate of 125,000 tons per month, at least through June 1970. At that point our world-wide inventory would be very substantial, when taken together with a "hot" production base. Accordingly, we believe we can plan on reducing air munitions production, beginning in July 1970, to the lowest sustaining rate—about 50,000 tons per month—from which we can readily expand it to the present rate within a period of 4–6 months.

The next item, a reduction of about $30 million in FY 1969 and $47 million in FY 1970 for ship gun ammunition and related items, is based on a drop in Southeast Asia consumption below the level projected in the original FY 1970 budget. Consumption in November and December 1968 averaged about 2,600 tons per month, and that rate was projected through the FY 1970 procurement lead time. Since December, consumption has declined to about that same rate per month, which is the rate we now project through December 1970. To provide a margin of safety, we plan to reduce the production of ship gun ammunition to about 2,100 tons per month in CY 1970, with a savings of about $44 million. The remaining $3 million in this item reflects a reduction in the FY 1970 procurement of ship gun barrels. The lower rate of ammunition consumption will also result in a slower rate of wear-out for gun barrels.

The next item on Table 1, Defense Communications Planning Group, involves the special anti-infiltration system initiated by former Secretary of Defense McNamara in 1967, under the code name Dye Marker/Muscle Shoals. The original plan did not work out as expected and, as a result, important reductions have occurred in the requirements for this system. The original FY 1969 budget, approved by the Congress last year, had by December 1968 already gone through a number of revisions. The original total of about $691 million was reduced to $579 million. The principal decreases were in munitions, offset in large part by increases in sensors.

The reduction we now propose, $54.6 million in FY 1969, again consists mostly of munitions and related items. However, $11 million represents a reduction in the procurement of sensors which can be made available from existing stocks. With these reductions, the revised FY 1969 program now stands at about $524 million, about $167 million less than the original budget approved by the Congress.

The $95 million reduction in aircraft and spares ($6.8 million in FY 1969 and $88.1 million in FY 1970) is the aggregate of four decreases and one increase. Because combat attrition in Southeast Asia has been running below the levels projected, we can eliminate the planned FY 1970 buy of CH–53D heavy transport helicopters (with a saving of about $73 million), and reduce the CH–46F medium transport helicopter buy (with a saving of $20 million). The third FY 1970 reduction is related to the halt in the bombing of North Vietnam. The DASH anti-submarine warfare drone helicopters, which were to be converted to reconnaissance vehicles in FY 1970, are no longer needed and the entire program of 30 drones can be deleted, with a saving of $8 million. The $6.8 million reduction in FY 1969, shown on Table 1, simply reflects a change in the estimated unit cost of 28 so-called "quiet aircraft" included in the Air Force supplemental aircraft program.

Combat attrition for the UH–1E, the single engine Huey used by the Marine Corps in Southeast Asia, has been running higher than projected. Therefore, to maintain the inventory, $13 million is being requested in the FY 1970 budget to procure the UH–1N, a twin engine Huey.

The next item on Table 1 involves modernization of the Republic of Vietnam Armed Forces (RVNAF) which I discussed in connection with my report on Vietnam.

The last entry in the Southeast Asia category, "Miscellaneous," is an aggregate of a number of reductions totaling about $46 million in FY 1969 and $86 million in FY 1970. . . .

Non-Southeast Asia General Purpose Forces

Summarized in the next category shown on Table 1 are the changes we propose in the non-Southeast Asia General Purpose Forces programs.

The first item is the F–111D. Because of the cutback in the FB–111 program, changes will have to be made in both the FB–111 and F–111 production schedules. After the last of the FB–111s are delivered in December 1970, we plan to hold F–111 production to the minimum sustaining rate. To do so, we will have to buy an additional quantity of tactical F–111s in FY 1970. The increases in funds shown on Table 1 reflect these adjustments in the production schedules. The total number of tactical F–111s to be procured for the U.S. Air Force is the same as previously planned. In addition, 24 F–111Cs are being produced for sale to the Australian Air Force.

In reviewing the FY 1970 budget, we found that the production schedule for the EA–6B aircraft was out of phase with the production schedule for its ground support equipment. Apparently, the continually rising cost of the aircraft absorbed some of the funds intended for the ground equipment, leaving only enough to provide ground support for a limited number of aircraft through the FY 1970 lead time. Inasmuch as the lead time for ground support equipment is considerably longer than for the aircraft itself, the only practical way in which we can bring the two into proper balance is to reschedule the aircraft procurement program. We still plan to buy the same total number of EA–6Bs, but we will now buy them over a three-year period instead of a two-year period. The net effect is a reduction of $67.5 million in FY 1970.

The British Harrier, a VTOL supersonic fighter, is proposed for procurement for the Marine Corps in exchange for the F–4J previously requested in FY 1970 budget.

The next two items, Harrier and F–4J, represent an even cost tradeoff. The Marine Corps is very anxious to acquire a V/STOL fighter aircraft, which would be much less dependent on fixed air bases and which could be used for both close air support and air defense. The United Kingdom has been working on such an aircraft, the Harrier, for some years. Flight testing has been completed and deliveries are now being made to the Royal Air Force. The Marine Corps has requested $57.6 million for the procurement of an initial buy of 12 Harriers in FY 1970, to be used for service testing and the development of tactical doctrine. In exchange, they are willing to give up the procurement of $57.6 million worth of F–4s in FY 1970, reducing the total buy in that year by about one-third.

The $2.9 million increase shown for Miscellaneous Aircraft Procurement is the net of three minor adjustments.

The next category of changes concerns the Navy Shipbuilding Program. This program is in urgent need of a much more comprehensive review than we have thus far had time to give it. Not only have serious cost overruns been encountered, but the longer-range program needs to be restructured. The Defense Department has for some years been pushing the fleet modernization problem into the future. The FY 1970–74 program, while quite reasonable in its parts, does not appear to be very practical as a whole. It peaks at a very high level in FY 1971 and then declines to a relatively low level by FY 1974. We plan to study both this and the cost overrun problem in greater detail in the months ahead. Our review to date has been primarily concerned with the FY 1970 and prior year shipbuilding programs. The changes we now propose are shown in Table 1. We are recommending some cancellations and some changes in the programs to be able to fund some of the overruns in the FY 1969 and FY 1970 budgets. I again would like to emphasize that much further study will be necessary to straighten out this shipbuilding program, and we hope to have a better long-range shipbuilding program to present to you in the FY 1971 budget.

The first change involves the new high-speed attack submarine program. The original FY 1970 budget included $504.5 million for the construction of three of these new SSN–688 class submarines (in addition to $31.5 million of FY 1969 advance procurement funds), plus $72 million for advance procurement of long lead-time items for several more to be started in FY 1971. We believe it would be prudent in undertaking a new program of this scope to proceed somewhat more slowly. Accordingly, we propose to fully fund only two submarines in FY 1970, deferring the third to FY 1971. We would, however, retain in the FY 1970 budget $47 million to procure long lead-time items for the third submarine, so that it could be delivered on about the same schedule as that envisioned in the original FY 1970 budget. The net reduction, therefore, would be $105.5 million ($152.7 million less $47.2 million for advance procurement).

The original FY 1970 budget included $45.3 million for two ATS salvage tugs. This is a lower priority program which can be safely deferred at least another year.

The next item, a total of about $350 million in FY 1969–70, represents the additional funds required to finance cost overruns in the shipbuilding program which are expected to mature before June 30, 1970. The total deficit in the shipbuilding program, computed on a cost-to-completion basis for all ships approved and funded, is now estimated at $600 to $700 million. About $183 million of this total is expected to mature before June 30, 1969, another $167 million in FY 1970, and the balance sometime after June 30, 1970.

The Navy proposes to provide the additional $182.7 million needed in FY 1969 by eliminating three ships, as shown on Table 1—a destroyer escort (–$41.6 million), a submarine tender (–$68.6 million), and a destroyer tender (–$72.5 million). The destroyer escort was to be an experimental vessel powered by a gas turbine engine. Since it now appears that the new DD–963 class destroyer (formerly the DX) will also have a gas turbine propulsion system, there is no longer any need to build that destroyer escort. The destroyer tender and submarine tender were both planned to replace existing ships. Since the two existing ships can be continued in service longer if necessary, the two new ships can be eliminated.

To provide the $167 million of additional funds required in FY 1970, the Navy proposes the next four reductions shown on Table 1. The first would involve the cancellation of two of the three guided missile frigate (DLG) conversions planned for FY 1970, and a decrease of $10 million in advance procurement funds for the next four ships to be converted in FY 1971, for a total reduction of $76 million. The second would eliminate the $7 million in advance procurement funds requested in the FY 1970 budget for 10 ocean minesweepers (MSO) to be converted in FY 1971. The third would reduce the FY 1970 buy of P–3 anti-submarine warfare patrol aircraft by $15 million. The fourth would involve a large number of relatively small reductions in the FY 1970 Other Procurement, Navy, appropriation request.

These four reductions total $172 million. However, $5 million will have to be added to the Navy FY 1970 Operation and Maintenance request to overhaul the two guided missile frigates in lieu of conversion. Thus, the net reduction in these five items is $167 million.

Some of these reductions proposed by the Navy are simply deferrals, but others represent changes in requirements. I recognize that this is not a very good way to manage the shipbuilding program. However, we must begin to get this program under better control, and the first step is to hold the managers to their estimates. This will provide them with the needed incentive to either manage the program more efficiently or come up with more realistic estimates. I was surprised to find that one claim for additional reimbursements on a $159 million contract for 14 DE–1052 class destroyer escorts, funded in FY 1964–65, was recently settled for $96.5 million, an increase of almost two-thirds. That claim was based on design changes made by the Navy after the contract was negotiated and on delays in the delivery of government-furnished equipment. Two other firms building this same class ship have also filed claims for the same reasons—one for $120 million on 27 ships and the other $37 million on five ships—but these claims have not yet been settled.

The cost overrun problem is a particularly thorny one. When I discovered the extensive cost overruns in the shipbuilding program, I immediately ordered a check for overruns in other programs. Based on my initial investigation, we found a total of between $1 and $1.2 billion in other cost overruns. This includes, for example, the Army's Cheyenne program, the Air Force's C–5 and F–111 A/E/D programs, and additional overruns in the Navy's programs other than shipbuilding.

I am not at all confident that every overrun problem has been identified to date. Consequently, I intend to continue looking into this problem in connection with our comprehensive review, and will report back to the Congress any additional deficits we uncover. I sincerely hope I will find no more, since the $1.7–$1.8 billion we have already uncovered means that we must fund this deficit without being able to show any additional defense capability as a result of the outlay.

The small reductions shown for Other Miscellaneous Procurement on Table 1 are the net result of adjustments in a number of different procurement programs. Included among the increases in FY 1970 are $30 million for classified projects and $9 million for Navy E–2C aircraft avionics test equipment. The FY 1970 decreases include $14.2 million for self-contained, transportable medical units, $5 million for Air Force vehicles, $10 million for Air Force traffic control radars, and $11 million for Sparrow missiles (Air Force and Navy), $15 million for classified projects, and $4 for computers. The FY 1969 reduction of $3.4 million is in the Pershing modification program.

Two changes in the Military Construction program deserve special mention. The first is an increase of $14.7 million in FY 1970 for aircraft shelters. Secretary Clifford, at a North Atlantic Council meeting last November, announced plans to ac-

Additional funds are being requested for construction of aircraft shelters to further accelerate the program for protection of U. S. aircraft on European bases.

celerate the aircraft shelter program in Europe. Some $33 million was transferred from the Military Construction Contingency Fund to the Air Force for this purpose. With this transfer the program now totals $66 million, sufficient for 342 aircraft shelters and related support facilities.

Considering the concentration of U.S. aircraft on European bases, I believe that program should be further accelerated. The additional $14.7 million will provide 36 more aircraft shelters and essentially complete the dispersal pavements, POL storage, communications and navigation aids hardening, and the security facilities needed at the European bases.

The second change, a reduction of $16 million in FY 1970, reflects an agreement reached with our NATO partners in January 1969 to reimburse the United States, up to an amount of $96 million, for the cost of relocating our forces from France. Reimbursements will be made at the rate of $16 million a year. The first annual installment will be applied to our share of the FY 1970 NATO Infrastructure program, thus reducing the New Obligational Authority (NOA) required by an equal amount.

The $8.4 million increase in FY 1970 for other Military Construction projects is the net result of relatively small adjustments in a number of separate projects.

The next item, a reduction of $26 million in FY 1970, reflects the inactivation of a number of naval vessels (8 DD/DEs, 4 DERs, 1 AE, 2 APBs, 2 SS and 1 AF) and a reduction in Navy support. These are all lower priority forces and their deletion should not have any significantly adverse impact on the Navy's overall combat capabilities. . . .

The next heading, Military Personnel and Operation and Maintenance, with two exceptions, encompasses a large number of relatively small adjustments.

The first exception is a reduction of $70 million for civilian personnel. . . .

The second exception is REDCOSTE—the Defense Department's program to reduce military expenditures in Europe wherever this could be done without adversely affecting combat readiness. The original FY 1970 budget anticipated savings of about $160 million from this effort. We have reexamined the impact of the FY 1970 REDCOSTE program and are convinced it is somewhat too ambitious in the time frame contemplated. The Army and Air Force in particular cannot implement the program on the schedule originally planned. Accordingly, we propose to restore $17 million of the $56 million deleted from the Army budget under REDCOSTE, and $19 million of the $88 million deleted from the Air Force budget.

Airlift and Sealift Forces

The next major category, Airlift and Sealift Forces, involves two changes in FY 1970—an increase of $54.4 million for the procurement of more C–130Es, and an increase of $13.8 million for the retention of certain Air Force Reserve Component units.

Last fall, the Defense Department decided to buy 36 more C–130s (18 with FY 1968 funds specifically appropriated by the Congress for this purpose and 18 through the reprogramming of FY 1969 funds) because of higher-than-expected attrition on this aircraft in Vietnam. The C–130s we now propose to add to the program are to replace the C–7s and C–123s expected to be lost in Vietnam, and to offset the eventual transfer of C–123s to the South Vietnamese Air Force. This transfer is part of the Phase II force modernization I spoke about earlier. Without replacement, this loss of C–123s and C–7s would reduce our tactical airlift capabilities below the level I believe is needed.

With regard to the Air Force Reserve Components item, the original FY 1970 budget provided for the conversion of four C–119 Air Force Reserve units to other missions, but no decision had been made on what those other missions would be. We have now reviewed the mission requirements for these four units and have concluded that two should be converted to AC–119 gunships, one to tactical air support, and one to tactical air support combat crew training.

The original FY 1970 budget also provided for the inactivation of five Air National Guard air defense units and the conversion of two airlift units to other, unspecified missions. We have now decided to convert all seven of these Air National Guard units to other missions as follows: one tactical air support, two air refueling, two C–141 associate, one F–100 tactical fighter, and one F–100 combat crew training.

Most of the increase for the Air Force Reserve Components, $10.8 mil-

Funds in the amount of $54.4 million are being requested to increase procurement of C–130E aircraft.

lion, is for Operation and Maintenance. The balance of the increase, $3 million, is for Military Personnel and will involve an increase of about 2,400 drill pay spaces at end FY 1970.

Other Research and Development

I have already discussed a number of research and development changes in connection with other major categories, particularly Strategic Forces. The next major category, Other Research and Development, includes four items which have not yet been discussed.

The first, a reduction of $5 million in the Heavy Lift Helicopter (HLH) project (from $20 million to $15 million), would involve a three-month delay in contract definition for this new helicopter, which is being developed as a replacement for the CH–54. Since we have not yet decided whether to go ahead with full-scale development of the HLH, this small delay is acceptable.

The next item is a reduction of $51 million in the Manned Orbiting Laboratory (MOL). The original FY 1970 budget included $576 million for this program. That amount would have provided for seven launches. A careful review of the work done to date has convinced us that six launches would probably be enough to accomplish all of the approved objectives. The elimination of one launch will save $20 million. The remaining reduction of $31 million will simply stretch out the program and delay the first launch by two or three months.

The third item is an increase of $7.9 million for a special Infrared Technology project. The original FY 1970 budget included only $5 million for this purpose. I believe a greater effort on this project would be a worthwhile investment.

The final item in this category is a $50 million increase in the Emergency Fund. Last year, the Defense Department requested $125 million for this purpose; the Congress provided only $50 million (plus the usual $150 million in transfer authority). As a result, the preceding Administration requested only $50 million for FY 1970.

I am, of course, aware of the reasons why the Congress reduced the FY 1969 appropriation for the Emergency Fund to only $50 million. However, I am also aware of the urgent need for some degree of flexibility in the management of the DOD research and development effort. In a program of this kind, we cannot, some 18 months in advance of the end of the fiscal year, anticipate all of the requirements in detail. Unless we have an uncommitted reserve of funds, the only way we can meet emergency research and development problems during the year is to continually rejuggle the entire program. This is obviously undesirable from a management point of view. Accordingly, we are requesting an increase of $50 million in the FY 1970 Emergency Fund, to a total of $100 million. I will see to it that this fund is used only for the purposes intended by the Congress, namely, to meet unanticipated high priority requirements. Any balance remaining unused at the end of the fiscal year will be returned to the Treasury, and will not be applied to less urgent requirements simply because the funds are available.

The $18 million in Miscellaneous Research and Development reductions includes $10 million for a classified project, $5 million for the Deep Submergence Search Vehicle program (rdeucing the degree of currency in the development of components) and $3 million for ocean exploration.

The last item on Table 1 involves a reduction in the estimated Budget Authority required by the Homeowners Assistance Fund in FY 1969–70. Obligations are now expected to be $10 million lower in FY 1969 and $7 million lower in FY 1970 than previously estimated. Accordingly, the $1.8 million in New Obligational Authority requested for FY 1970 will not be required.

Table 1

Department of Defense

SUMMARY OF PROPOSED ADJUSTMENTS TO THE FY 1969 SUPPLEMENTAL AND FY 1970 BUDGET

(MILLIONS OF DOLLARS)

	Total Obligational Authority		
	FY 1969	FY 1970	FY 69–70
STRATEGIC FORCES			
Sentinel ABM	−101.0	−896.0	−997.0
Nike–X Advanced Development		−34.0	−34.0
FB–111	−107.3	−320.9	−428.2
Advanced Manned Strategic Aircraft		+23.0	+23.0
SRAM	−126.6	−196.4	−326.0
Procurement	(−42.2)	(−110.8)	(−153.0)
B–52	(−37.7)	(−102.6)	(−140.3)
FB–111	(−49.7)		(−49.7)
Research and Development		(+17.0)	(+17.0)
Minuteman III		−156.9	−156.9
Improved Guidance System (Poseidon)		+12.4	+12.4
Satellite Early Warning		+43.0	+43.0
AWACS		−15.0	−15.0
SOUTHEAST ASIA ITEMS			
B–52 Sorties	+25.1	+27.4	+52.5
Ground Munitions		−460.0	−460.0
Transportation (Ammunition)		−34.4	−34.4
Air Munitions	−89.5	−422.4	−511.9
Ship Gun Ammunition	−30.0	−47.1	−77.1
Defense Communications Planning Group	−54.6		−54.6
Aircraft and Spares	−6.8	−88.1	−94.9
RVNAF Modernization Phase II	+35.8	+120.3	+156.1
Production Base Support	(−75.0)[b]		(−75.0)[b]
Miscellaneous	−45.9	−86.0	−131.9
NON-SOUTHEAST ASIA GENERAL PURPOSE FORCES			
Aircraft Procurement			
F–111D	+11.5	+155.7	+167.2
EA–6B		−67.5	−67.5
Harrier		+57.6	+57.6
F–4J		−57.6	−57.6
Miscellaneous		+2.9	+2.9
Shipbuilding Program			
SSN (High Speed Submarine)		−105.5	−105.5
ATS Salvage Tugs		−45.3	−45.3
Claims and Cost Growth	+182.7[a]	+167.0	+349.7
DE Destroyer Escort (Gas Turbine)	(−41.6)[b]		(−41.6)[b]
AS Submarine Tender	−68.6		−68.6
AD Destroyer Tender	−72.5		−72.5
DLG Guided Missile Frigate Conversion		−76.0	−76.0
MSO Minesweeper Conversion		−7.1	−7.1
P–3 ASW Aircraft Procurement		−15.0	−15.0
Miscellaneous Navy Procurement		−73.9	−73.9
DLG Overhaul		+5.0	+5.0
Other Miscellaneous Procurement	−3.4	−24.6	−28.0
Military Construction			
Aircraft Shelters		+14.7	+14.7
NATO Infrastructure		(−16.0)[c]	(−16.0)[c]
Other	−0.1	+8.4	+8.3
Deletion of Lower Priority Forces		−26.0	−26.0
Military Personnel and Operation and Maintenance			
Civilian Personnel		−70.0	−70.0
Redcoste		+36.0	+36.0
Other	−11.2	−36.4	−47.6
AIRLIFT AND SEALIFT FORCES			
C–130 Aircraft		+54.4	+54.4
Reserve Component Air Lift Units		+13.8	+13.8

Table 1 (Con't)

Department of Defense

SUMMARY OF PROPOSED ADJUSTMENTS TO THE FY 1969 SUPPLEMENTAL AND FY 1970 BUDGET

(MILLIONS OF DOLLARS)

	Total Obligational Authority		
	FY 1969	FY 1970	FY 69–70
OTHER RESEARCH AND DEVELOPMENT			
Heavy Lift Helicopter (HLH)		−5.0	−5.0
Manned Orbiting Laboratory		−51.0	−51.0
Infrared Technology		+7.9	+7.9
Emergency Fund		+50.0	+50.0
Miscellaneous		−18.0	−18.0
HOMEOWNERS ASSISTANCE FUND	−10.0	−7.0	−17.0
Net Reduction in Total Obligational Authority (TOA)	−625.9	−2,643.6	−3,269.5
Financial Adjustments[d]	+485.2	−459.5	+25.7
Net Reduction in New Obligational Authority (NOA)	−140.7	−3,103.1	−3,243.8

[a] $150.5 million of this amount is applicable to FY 1968 and prior years.

[b] This is a reduction in FY 1968 TOA.

[c] NOA only, TOA unchanged.

[d] The FY 1969 financing adjustments are as follows: $108.9 million representing amounts to be reprogrammed to prior years and derived from reductions for Submarine Tender ($—68.6 million) and Destroyer Tender ($—72.5 million) partially offset by FY 1969 portion of shipbuilding "Claims and Cost Growth" ($+32.2 million); and $367.5 million increase in amounts carried over to finance FY 1970 programs derived from reductions in Sentinel ($—98.0 million), Air Force ammunition ($—108.6 million), ship gun ammunition ($—30.0 million), SRAM program ($—129.6 million), a Navy military construction project ($—0.1 million), and a Homeowners Assistance reduction, exclusive of the reductions in authorization to spend agency debt receipts ($—1.2).

The FY 1970 financing adjustments are as follows: The $367.5 million carry into the year as itemized above; $16 million applied to NATO Infrastructure to be provided through reimbursements from NATO allies; $75 million to be recouped from reduction in Army's FY 1968 production base support equipment; $7.4 million to be recouped from a FY 1968 project at the Boston Navy shipyard; offset by a $3.4 million reduction in Homeowners Assistance authorization to spend agency debt receipts and an increase to carry over to FY 1971 of $2.9 million.

Table 2

Department of Defense

SUMMARY—FY 1969 SUPPLEMENTAL BUDGET REVISIONS

(AMOUNTS IN THOUSAND DOLLARS)

Appropriation Title	1969 Supplemental Estimate	Recommended Change (+ or −)	Amended Estimate
Military Personnel			
Military Personnel, Army	491,000	−23,800	467,200
Military Personnel, Navy	224,000	−3,800	220,200
Military Personnel, Marine Corps	71,000	−9,500	61,500
Military Personnel, Air Force	418,000	−4,400	413,600
Reserve Personnel, Army	5,600	—	5,600
Reserve Personnel, Navy	8,500	—	8,500
Reserve Personnel, Marine Corps	9,900	−3,100	6,800
Reserve Personnel, Air Force	1,900	—	1,900
National Guard Personnel, Army	16,400	—	16,400
National Guard Personnel, Air Force	3,400	—	3,400
Retired Pay, Defense	175,000	—	175,000
Total—Military Personnel	1,424,700	−44,600	1,380,100
Operation and Maintenance			
Operation and Maintenance, Army	259,200	−7,800	251,400
Operation and Maintenance, Navy	26,100	—	26,100
Operation and Maintenance, Marine Corps	28,900	—	28,900
Operation and Maintenance, Air Force	373,400	+25,100	398,500
Operation and Maintenance, Defense Agencies	40,500	—	40,500
Operation and Maintenance, Army National Guard	13,000	—	13,000
Operation and Maintenance, Air National Guard	15,682	—	15,682
Court of Military Appeals, Defense	18	—	18
Total—Operation and Maintenance	756,800	+17,300	774,100
Procurement			
Procurement of Equipment & Missiles, Army	727,800	−10,800	717,000
Aircraft Procurement, Air Force	102,600	−102,600	—
Total—Procurement	830,400	−113,400	717,000
Total—Military Functions Supplemental NOA	3,011,900	−140,700	2,871,200

Table 3

Department of Defense
SUMMARY—FY 1970 BUDGET REVISIONS

(AMOUNTS IN THOUSAND DOLLARS)

Appropriation Title	1970 Budget Estimate	Recommended Change (+ or −)	Amended Estimate
Military Personnel			
Military Personnel, Army	8,535,000	+16,700	8,551,700
Military Personnel, Navy	4,526,000	−17,500	4,508,500
Military Personnel, Marine Corps	1,580,000	−3,000	1,577,000
Military Personnel, Air Force	5,959,000	−6,200	5,952,800
Reserve Personnel, Army	311,000	—	311,000
Reserve Personnel, Navy	139,700	+700	140,400
Reserve Personnel, Marine Corps	45,700	—	45,700
Reserve Personnel, Air Force	87,700	+500	88,200
National Guard Personnel, Army	363,500	—	363,500
National Guard Personnel, Air Force	101,600	+1,500	103,100
Retired Pay, Defense	2,735,000	—	2,735,000
Total—Military Personnel	24,384,200	−7,300	24,376,900
Operation and Maintenance			
Operation and Maintenance, Army	7,596,000	−91,500	7,504,500
Operation and Maintenance, Navy	5,383,000	−59,300	5,323,700
Operation and Maintenance, Marine Corps	457,000	—	457,000
Operation and Maintenance, Air Force	6,716,000	−4,300	6,711,700
Operation and Maintenance, Defense Agencies	1,098,000	−3,000	1,095,000
Operation and Maintenance, Army National Guard	306,000	—	306,000
Operation and Maintenance, Air National Guard	333,334	+9,200	342,534
Claims, Defense	41,000	—	41,000
Contingencies	10,000	—	10,000
Court of Military Appeals, Defense	666	—	666
Total—Operation and Maintenance	21,941,000	−148,900	21,792,100
Procurement			
Procurement of Equipment & Missiles, Army	5,933,000	−863,900	5,069,100
Procurement of Aircraft & Missiles, Navy	3,409,000	−173,500	3,235,500
Shipbuilding and Conversion, Navy	2,698,300	−66,900	2,631,400
Other Procurement, Navy	2,271,000	−248,300	2,022,700
Procurement, Marine Corps	650,600	—	650,600
Aircraft Procurement, Air Force	4,081,000	−305,800	3,775,200
Missile Procurement, Air Force	1,794,000	−307,600	1,486,400
Other Procurement, Air Force	2,320,000	−381,700	1,938,300
Procurement, Defense Agencies	84,000	−6,400	77,600
Total—Procurement	23,240,900	−2,354,100	20,886,800
Research, Development, Test, & Evaluation			
Research, Development, Test, & Evaluation, Army	1,822,500	+27,000	1,849,500
Research, Development, Test, & Evaluation, Navy	2,207,100	+4,400	2,211,500
Research, Development, Test, & Evaluation, Air Force	3,594,300	−33,100	3,561,200
Research, Development, Test, & Evaluation, Defense Agencies	500,200	—	500,200
Emergency Fund, Defense	50,000	+50,000	100,000
Total—Research, Development, Test, & Evaluation	8,174,100	+48,300	8,222,400
Military Construction			
Military Construction, Army	1,037,500	−641,900	395,600
Military Construction, Navy	398,400	−1,200	397,200
Military Construction, Air Force	385,300	+3,800	389,100
Military Construction, Defense Agencies	74,500	—	74,500
Military Construction, Army Reserve	10,000	—	10,000
Military Construction, Naval Reserve	9,600	—	9,600
Military Construction, Air Force Reserve	5,300	—	5,300
Military Construction, Army National Guard	15,000	—	15,000
Military Construction, Air National Guard	13,200	—	13,200
Total—Military Construction	1,948,800	−639,300	1,309,500
Family Housing			
Family Housing, Defense	607,800	—	607,800
Homeowners Assistance Fund, Defense	9,700	−1,850	7,850
Total—Family Housing	617,500	−1,850	615,650
Civil Defense			
Operation and Maintenance, Civil Defense	50,700	—	50,700
Research Shelter Survey & Marking, CD	24,600	—	24,600
Total—Civil Defense	75,300	—	75,300
Budget Concepts Adjustments			
Trust funds	7,429	—	7,429
Intragovernmental transactions	−7,200	—	−7,200
Applicable receipts	−144,507	—	−144,507
Total—Budget Concepts Adjustments	−144,278	—	−144,278
Grand Total—Military Functions, NOA	80,237,522	−3,103,150	77,134,372
Military Assistance			
Military Assistance, Executive	375,000	—	375,000
Foreign Military Credit Sales, Executive	275,000	—	275,000
MAP Trust fund	750,000	—	750,000
MAP Applicable Receipts	−992,325	—	−992,325
Total—Military Assistance	407,675	—	407,675
Total—Department of Defense, NOA	80,645,197	−3,103,150	77,542,047
Outlays			
Military Functions	78,471,000	−1,113,000	77,358,000
Military Assistance	529,000	-	529,000
Total—Department of Defense	79,000,000	−1,113,000	77,887,000

Table 4

Department of Defense
SOURCE OF FUNDS FOR AIRCRAFT, MISSILES, SHIPS AND TRACKED COMBAT VEHICLES FY 1970 PROCUREMENT PROGRAM

($ IN THOUSANDS)

	Total Amount of FY 1970 Program			Funding Available for Financing Program in Part	NOA Requested for Authorization		
	Original	Change	Revised		Original	Change	Revised
Aircraft							
Procurement of Equipment and Missiles, Army	941,500	—	941,500	—	941,500	—	941,500
Procurement of Aircraft and Missiles, Navy (and Marine Corps)	2,658,900	−159,700	2,499,200	90,000	2,568,900	−159,700	2,409,200 [1]
Aircraft Procurement, Air Force	4,556,000	−218,400	4,337,600	237,400	4,406,000	−305,800	4,100,200 [2]
Sub-total—Aircraft	8,156,400	−378,100	7,778,300	327,400	7,916,400	−465,500	7,450,900
Missiles							
Procurement of Equipment and Missiles, Army	1,347,660	−375,000	972,660	15,000	1,347,660	−390,000 [3]	957,660
Procurement of Aircraft and Missiles, Navy	865,100	−13,800	851,300	—	865,100	−13,800	851,300
Procurement, Marine Corps	20,100	—	20,100	—	20,100	—	20,100
Missile Procurement, Air Force	1,882,200	−265,400	1,616,800	130,400	1,794,000	−307,600	1,486,400
Sub-total—Missiles	4,115,060	−654,200	3,460,860	145,400	4,026,860	−711,400	3,315,460
Navy Vessels							
Shipbuilding & Conversion, Navy	2,848,550	−66,900	2,781,650	150,250	2,698,300	−66,900	2,631,400
Tracked Combat Vehicles							
Procurement of Equipment and Missiles, Army	298,300	+7,500	305,800	—	298,300	+7,500	305,800
Procurement, Marine Corps	37,700	—	37,700	—	37,700	—	37,700
Sub-total—Tracked Vehicles	336,000	+7,500	343,500	—	336,000	+7,500	343,500
GRAND TOTAL	15,456,010	−1,091,700	14,364,310	623,050	14,977,560	−1,236,300	13,741,260

[1] Of the amount requested for authorization, $25.0 million is to be derived by transfers from the DOD Stock Funds.

[2] Of the amount requested for authorization, $325.0 million is to be derived by transfers from the DOD Stock Funds.

[3] Reflects $15 million reduction in FY 1969 Sentinel program and NOA.

SOURCE OF FUNDS FOR THE FY 1970 RESEARCH, DEVELOPMENT, TEST & EVALUATION PROGRAM

($ THOUSANDS)

	Total Amount of Original FY 1970 Program	Funding Available for Financing Program in Part	Original Authorization Requested	Recommended Changes	Revised Authorization Request
Research, Development, Test, & Evaluation					
Army	1,822,500		1,822,500	+27,000	1,849,500
Navy	2,207,100		2,207,100	+4,400	2,211,500
Air Force	3,599,300	5,000	3,594,300	−33,100	3,561,200
Defense Agencies	500,200		500,200	—	500,200
Emergency Fund	50,000		50,000	+50,000	100,000
Total	8,179,100	5,000	8,174,100	+48,300	8,222,400

Space Probes To Study Arctic Radio Blackout

Scientists of the Air Force Cambridge Research Laboratories, the Army Ballistic Research Laboratory and the Defense Atomic Support Agency (DASA) will conduct a joint study of solar disturbance effects on radio propagation this summer in the Arctic.

The program calls for the launch of 36 instrumented research rockets to be fired from the Churchill Research Range in Manitoba, Canada.

The rockets will be fired to heights of 80 to 150 kilometers (50 to 93 miles) during a polar cap absorption (PCA) event, a radio blackout phenomenon peculiar to the Arctic region.

Measurements to be gathered during the launch program include the distribution of charged particle densities, temperatures and energies; radio transmission properties; atmospheric density; and the composition of the upper atmosphere during periods of solar proton disturbance.

Scientists hope that by studying the effects of solar activity it may be possible to develop techniques for predicting the intensity and duration of PCA events. This knowledge could be important in the future development of communication, navigation and radar systems.

The Churchill Research Range, operated by the National Research Council of Canada under joint finance by Canada and the National Aeronautics and Space Administration, is one of the largest rocket launch sites in North America.

James C. Ulwick of the Air Force Cambridge Research Laboratories, an element of the Air Force Office of Aerospace Research, is the PCA Program Technical Director. Program Manager is Dr. Charles A. Blank, Defense Atomic Support Agency.

Holloman AFB Testing Four New Missiles

The Air Force Missile Development Center, Holloman AFB, N.M., has expanded its missile testing role with the addition of four missiles to its programs:

- The Navy-developed Walleye, a television-guided, air-to-surface missile.
- The Short Range Attack Missile (SRAM), a rocket-propelled, air-to-surface, supersonic missile intended to provide strategic bombers with a "stand-off" capability.
- The anti-radiation missile Standard ARM, a second-generation electromagnetic radiation-seeking missile for use against radar sites.
- The Maverick, another development of the television-guided air-to-ground missile concept, now in the planning stages.

Air Force Human Resources Laboratory

New Concept for Behavioral Science Research

Colonel John G. Dailey, USAF

Scientific affluence and technological skills are pushing the boundaries of man's domain outward so rapidly it literally staggers the imagination. In every field of endeavor, agriculture, medicine, aerospace, and in an infinite number of other areas, the fund of knowledge is expanding at an unprecedented rate. As this new knowledge is rapidly translated into hardware and techniques, man imposes his will on an ever more permissive "mother nature." New methods of agriculture produce food in plenty where men used to starve. New medicines and techniques in surgery save lives where disease and deformity used to kill. Engineering skills have sent men beyond the moon; yet at the beginning of this century, nature was uncompromisingly hostile to attempts at other than surface travel.

We are beginning to master man's expanding environment, but we are paying a price in the demands placed upon man's intellectual and physical capabilities. It is difficult for man to keep pace with the new demands since his natural intellect and physical capacities have remained remarkably stable over this period. Chromosome research is unlocking the secrets of genetic control and progress is being made in the field of brain chemistry but, during the foreseeable future, man will be pitted against this technological world in much the same form as he presently exists.

Several complementary avenues exist for aiding man in accommodating to the demands of the increasingly complex world in which he lives. These are improved personnel selection and improved training, better utilization, and improved job structuring along with work simplification techniques. The Air Force has increased its effort in these vital areas by establishing the Air Force Human Resources Laboratory at Brooks AFB, Tex., in July 1968. Simply stated, the mission of this laboratory is to conduct research in the areas of personnel selection, management, and training designed to insure accomplishment of the Air Force mission in the most effective and efficient manner possible.

In its initial configuration, the new laboratory brings under one headquarters two long-established units. One is the Training Research Division located at Wright-Patterson AFB, Ohio. This division was formerly part of the Behavioral Sciences Laboratory. The other unit, located at Lackland AFB, Tex., is the Personnel Research Division. This division was formerly the 6570th Personnel Research Laboratory and, like the Training Research Division, was previously assigned to the Aerospace Medical Division of the Air Force Systems Command (AFSC).

In addition to the enlargement of these two organizations, three other divisions are being planned. These are a Technical Training Division to be located at the Lowry AFB Technical Training Center at Denver, Colo.; a Flying Training Division to be located at Williams AFB, Ariz.; and a Professional Education Division to be located at the Air University, Maxwell AFB, Ala.

The laboratory will span the range of Air Force human resources research in an effort to relate basic, exploratory and applied research directly to the needs of the using agencies. The aim and guiding philosophy are to provide both an anticipatory research program to promote the state of the art needed to meet future demands, and at the same time retain a responsive capacity to meet current research needs as they are identified. The laboratory will monitor basic research pertaining to human resources as well as

Colonel John G. Dailey, USAF, is Commander of the Air Force Human Resources Laboratory. He has served as Chief, Project RAND Group, in Air Force headquarters and, prior to assuming command of the laboratory, was Director, Office of Management Activities, Headquarters, Air Force Systems Command. Colonel Dailey holds a B.S. degree from the University of Maryland and an M.B.A. from George Washington University.

conduct a limited in-house activity. The exploratory development programs will bring forward promising technology to the point of application in the field setting. The applied or advanced development program will be conducted at operational sites to demonstrate feasibility, and to further refine methods and techniques of application.

Research Proximity to User Application

An advantage of this approach to research is the systematic development of ideas from concept to utilization. It emphasizes the need to locate the elements of the research organization in geographic proximity to major centers of influence. In fact, it dictates the laboratory organization (see page 22). The Human Resources Laboratory headquarters is located at Brooks AFB, Tex., near Air Training Command headquarters at Randolph AFB, the major user of laboratory products. The Training Research Division, charged with exploratory research, remained at Wright-Patterson AFB, Ohio, to take advantage of relationships and the two-way communication of future training needs with the System Program Offices of the AFSC Aeronautical Systems Division. The Personnel Research Division is located in working proximity to Headquarters, Air Training Command, and the Air Force Military Personnel Center in San Antonio, Tex.

The other divisions will also be located with this principle in mind. Williams AFB, Ariz., was selected as the site for the Flying Training Division. Williams AFB is an Air Training Command undergraduate pilot training base. It is contiguous to the Tactical Air Command's fighter complex consisting of Nellis, Luke and Davis-Monthan AFBs. It is also centrally located with regard to undergraduate navigator training at Mather AFB, Calif., and the Strategic Air Command's combat crew training at Castle AFB, Calif. The Technical Training Division is to be located at Lowry AFB, Colo. Lowry is one of the Air Training Command's technical training centers offering a wide selection of representative technical courses, and is also the site of the Air Force 3320th Retraining Group. The Professional Education Division will be placed at Maxwell AFB, Ala., on the campus of the Air University Command where close contact can be maintained with the Air University, the Air Force Institute of Technology, and the Air Force Academy.

The proximity of researcher to user fulfills several needs. The close association, the rubbing of shoulders, in a common effort of operational significance establishes a dialogue between the research scientist and operator that is frequently non-existent when research is conducted in a setting remote from on-going operations. The scientist learns the language and acquires an appreciation of operator problems, which leads to faster and more precise identification of research requirements. Daily contact maintains alignment of the research program to the real world needs and a rapid feedback of results. Another advantage of onsite research lies in the increased capacity of the user to implement favorable research findings. Since the user is "in the loop" during the feasibility demonstration, a trained cadre is in being and ready to implement findings at the conclusion of a successful project.

Human Resources Research Program

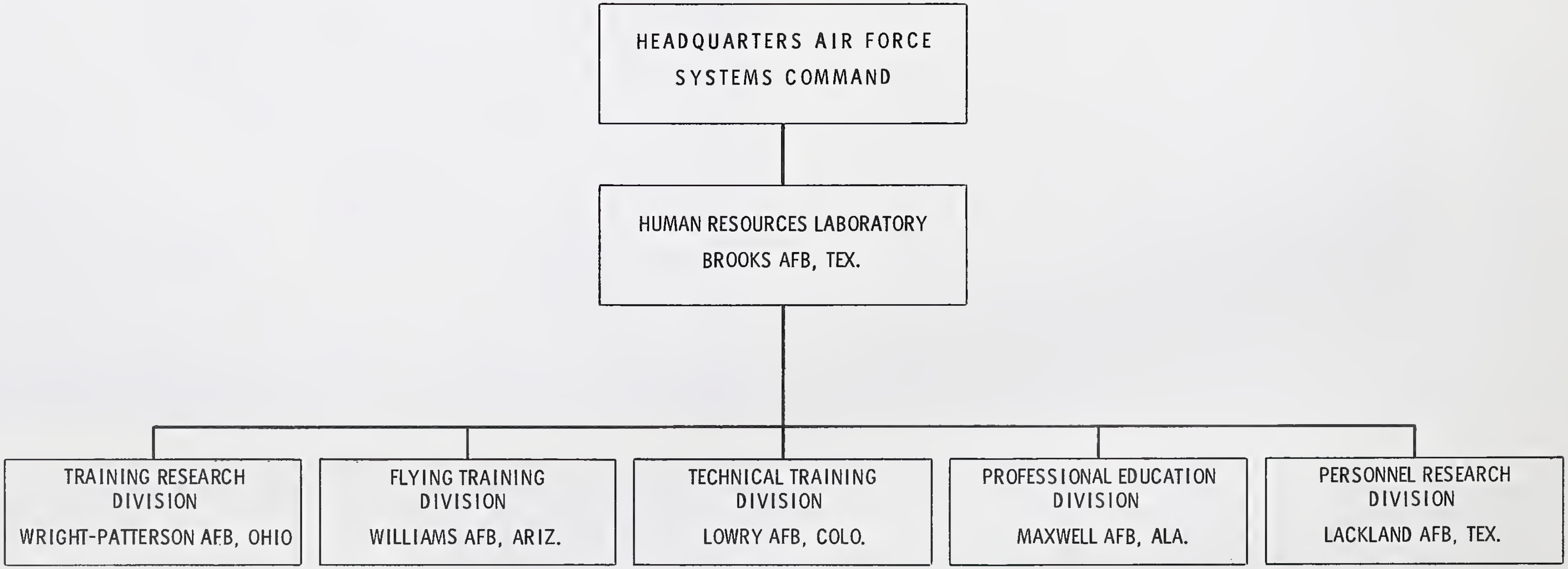
Although the charter of the Air Force Human Resources Laboratory implies a significant increase in capability for in-house research, the size of the task and range of problems faced will of necessity involve an enlarged contractual effort. The research program will consequently be a blend of effort which capitalizes on the strengths of both profit and nonprofit contractor organizations, and the in-house capability of the laboratory. The laboratory research program is oriented to those facets of Air Force personnel, education and training systems in which the potential for significant pay-off appears highest. The following research areas are described as representative of the program as it currently exists in either its on-going form or planned for initiation in the near future:

Flying Training Research.

This program will develop and test new concepts approaches, media, and devices for flight training. Initial emphasis will be upon undergraduate

Adaptive flight simulator.

AIR FORCE HUMAN RESOURCES LABORATORY


HEADQUARTERS AIR FORCE SYSTEMS COMMAND
HUMAN RESOURCES LABORATORY BROOKS AFB, TEX.
TRAINING RESEARCH DIVISION WRIGHT-PATTERSON AFB, OHIO
FLYING TRAINING DIVISION WILLIAMS AFB, ARIZ.
TECHNICAL TRAINING DIVISION LOWRY AFB, COLO.
PROFESSIONAL EDUCATION DIVISION MAXWELL AFB, ALA.
PERSONNEL RESEARCH DIVISION LACKLAND AFB, TEX.

pilot and navigator training. However, as essential manpower and funding become available, the effort will be expanded to the combat crew training for the fighter, bomber and airlift missions. The goal is to develop improved training systems which will provide the skills demanded by present and future tactical, strategic and airlift missions in the most cost-effective manner possible.

Technical Training and Professional Education.

Here again research will be carried out to develop the technology in curricula, methods, techniques, media devices and job performance aids to simplify the training tasks and still provide the skills the Air Force must have. Individualized instruction appears to be the key. It will rely upon the most sophisticated technological advances possible, computer-aided and computer-managed to develop the high quality of technical and professional skills demanded by both the present and future aerospace systems.

Personnel and Training Requirements of Planned Force Structures.

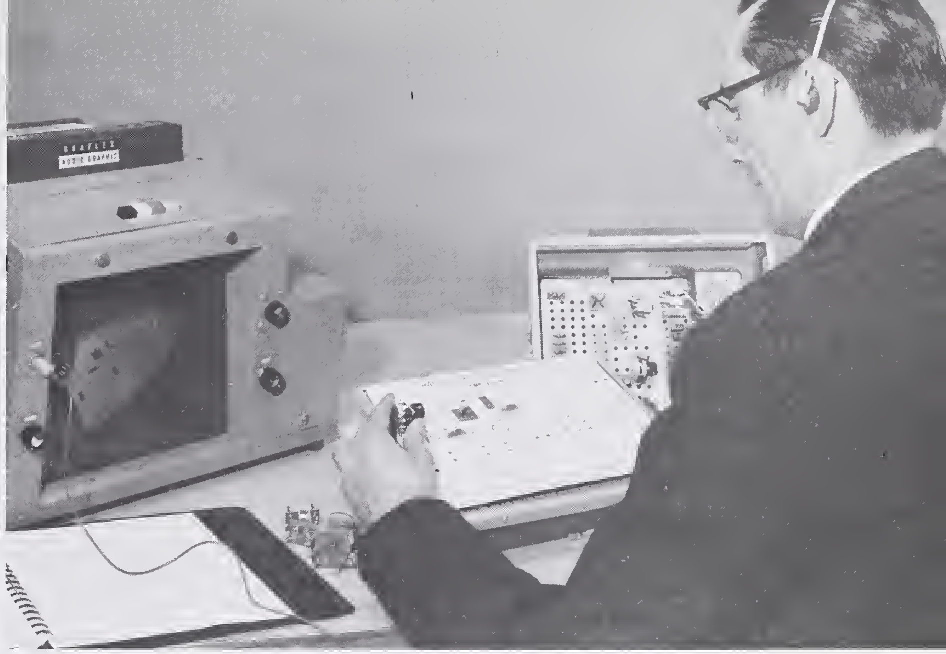
In this program, the effort is to develop and test the technology of human resources engineering, by which the training and manning requirements of planned systems can be matched with the human resources available in a timely and efficient manner.

Training and Simulation Techniques.

This program concentrates upon developing the engineering technology that is required to advance the state of the art in flight simulation. The complexity and cost of present and next generation weapon systems is so great that high fidelity full mission simulation appears to be the major improvement needed to increase proficiency to the levels demanded by these advanced systems. In addition to simulation for aerospace crew training, efforts will be devoted to simulation techniques as a tool for technical training and professional education.

Selection and Classification.

Air Force operational requirements necessitate the development of prototype tests and test batteries, and their revisions, for the continuing operation of the Air Force Personnel System. Research efforts will be oriented toward the development of predictors of success in training and on the job, new prediction systems, and new test formats and concepts. New techniques of measuring and quantifying job productivity and effectiveness will be sought.



Automated apprenticeship for technicians.

Personnel Resources and Evaluation.

This research program will concentrate upon a number of areas:

- Relationship of the characteristics of the manpower pool to Air Force needs.
- Effectiveness of recruiting and selection systems in procuring personnel possessing needed characteristics.
- Individual performance evaluation procedures and the use of such procedures in assignment and promotion.
- Measurement, prediction, and development of career attitudes and retention potential.
- Analysis and follow-up studies of the post utilization of military personnel.

Personnel Management Research.

The goal of this program is to provide for the development of command and control mechanisms for the Air Force Personnel System. Toward this goal, efforts will continue on the development of statistical-mathematical procedures to analyze and summarize personnel and cost data; the application of probability concepts for projecting and the composition of the personnel force; the development and maintenance of broad data bases on officers, airmen, and civilians; and the development of the capability to process large volumes of data to analyze large-scale problems in support of the total human resources research effort, including the development of sophisticated inquiry and display techniques.

As a final word, the Air Force investment in its human resources is a heavy one. It has a strength of over 800,000 to operate and maintain the most complex array of equipment ever devised by man. As many as 100,000 new members are recruited each year and an approximate equal number leave the service for productive civilian employment. At any point in time, a large proportion of its members are in a training status, either on the job or in formal resident courses. In such a large and ever changing organization, the problems facing personnel and training managers are formidable. The mission of the Air Force Human Resources Laboratory, to provide research leading to solutions to these problems, is challenging, dynamic and, most important, exciting. It will require an effective capacity to span the existing chasm between the mysteries of basic research, the development of this product in the nurture of the exploratory research programs, and then its careful demonstration under the demanding and practical review of the operational Air Forces.

Technology—The Goal and the Challenge

General James Ferguson, USAF

The Air Force Systems Command (AFSC) is charged with one of the largest, most complex, varied and important management jobs in the world involving an annual budget of almost $8 billion. Its activities annually write some 7,000 contracts, take 17,000 funding actions, and engage in over 275,000 contractual actions. The contracts range in value from a few dollars to over a billion dollars.

AFSC develops and procures products ranging from spacecraft, rocket boosters and missiles; to military fighters, bombers and transports, and associated armament; to communications systems and sensors involving all technologies with which to provide command and control of the Air Force operational capability. Its laboratories are among the largest in the Defense Department. Two test ranges provide world-wide radar and optical tracking essential to space exploration. Wind tunnels permit design verification for speeds to Mach 22 at altitudes to 250,000 feet. Rocket test stands accommodate engines producing 500,000 pounds thrust under atmospheric conditions encountered at 100,000 feet.

Our primary task is to maintain the proper balance among the changing technological and management disciplines, while at the same time remaining responsive to the needs of today, as well as those of the future.

To accomplish this we seek continued expansion of the technological base from which today's and tomorrow's military needs are forged. The mission of research and development has traditionally been futuristic, but the future is any point ahead of us in time. It can be 10 seconds, 10 minutes, or 10 years away. However, there is little need to prepare for the distant future unless one survives the trials of today.

The challenge is to bring that competence closer to the needs of today without diminishing our emphasis on the future.

Technology has advanced more rapidly in the past 50 years than in the previous 5,000. Yet soon after World War II, top U.S. scientists dismissed and derided the notion of an accurate intercontinental ballistic missile and, as late as 1956, a noted foreign astronomer called the prospect of space travel "utter bilge."

Farsighted military planners and scientists realized that we must look at least two decades ahead just to keep abreast and to survive in a swiftly changing world of technology. As a result, the U.S. Air Force activated the Air Research and Development Command (ARDC) on Jan. 23, 1950, consolidating most of the Air Force technical resources scattered through several commands. ARDC assumed responsibility for the research and development phases of new Air Force weapons.

As the 1960s began, the missions of ARDC and the Air Materiel Command (AMC) were re-evaluated by the Air Force, and the present Air Force Systems Command evolved on April 1, 1961.

Organization

More than 1,000 projects and tasks, in various stages of development and acquisition, are managed by AFSC, with more than half of them related to limited war activities. The thousands of contracts administered have a total obligation of more than $45 billion. In FY 1969 alone, the $7.6 billion allocation to AFSC, most of which was earmarked to purchase weapon systems, was a larger portion of the total Air Force budget of $27.7 billion than that of any other major command.

This workload is being managed with a manpower authorization of approximately 10,000 officers, 20,000 airmen and 32,000 civilians, all working to shorten the time between "idea" and "item." The calibre of our people more than makes up for our lack of numbers. Ninety-two percent of our research and development officers have college degrees, 65 percent hold the baccalaureate, 33 percent have masters degrees, and 2 percent have doctorate degrees.

To provide the most effective management of Air Force scientific and technical resources, AFSC, from its headquarters at Andrews AFB, Md., directs the operation of a world-wide network. From Cape Kennedy in Florida to Vandenberg AFB, Calif., and around the world, it manages some 300 separate installations or activities. Primary among these are six divisions, five development and test centers, the Space and Missile Systems Organization (SAMSO), and nine in-house laboratories.[1]

AFSC research and development activities are organized in four functional areas:

- Analyzing the technological threat.
- Advancing the technological base.
- Developing and procuring advanced aerospace systems.
- Test and evaluation of systems and subsystems.

Analyzing the Technological Threat

Due to the long lead time between the drawing board and initial operational capability (IOC) of a weapon system, it is important to U.S. national security to know in detail what other nations are doing in aerospace technology.

Foreign Technology Division (FTD), Wright-Patterson AFB, Ohio.

A future "Pearl Harbor" might give its warnings in a foreign scientific paper, a photograph, a public statement, or a May Day parade. It is the responsibility of AFSC's Foreign Technology Division (FTD) to acquire, analyze and report on foreign scientific and technological information and equipment to reduce the possibility of technological surprise. FTD's work enhances exploitation of foreign scientific and technical achievements, or weaknesses, to the advantage of U.S. aerospace research and development programs.

Highly skilled personnel using specialized equipment, including computers and a machine language translator capable of translating Russian to English at the rate of 300,000 words a day, produce finished intelligence studies on foreign aerospace technologies and electronic, aerodynamic, ballistic and space systems. Their findings, in the form of technical studies, briefs, weapon system assessments and special reports, are disseminated throughout the Defense Department.

FTD traces its ancestry back to World War I. Established as the Technical Data Section in Washington in 1917, it passed through a number of organization and title changes and has rendered a number of "sung" and "unsung" services to our country. One of the more exciting of these was participation in Project Paperclip, which brought key German scientists to this country after World War II to assist in the evaluation and exploitation of captured documents and materiel, making a considerable impact on aerospace technology.

Advancing the Technology Base

Superior, advanced aerospace systems are dependent upon strong, technically competent laboratories and a broad base of research and technology. AFSC's Aerospace Medical Division (AMD) and the nine in-house laboratories of our Director of Laboratories (DOL) provide this capability.

Aerospace Medical Division (AMD), Brooks AFB, Tex.

In any manned system, the most important component is man himself. In addition to his care and treatment, his limitations and capabilities are of vital concern in planning new systems for the Air Force.

The Aerospace Medical Division (AMD) is charged with management in the areas of bioastronautics research and development in support of the design and procurement of Air Force weapon systems. It is assigned research programs in support of the Air Force personnel system. It handles a number of clinical and aerospace medical requirements and administers post-graduate professional education programs in medicine, dentistry and aerospace medical subjects.

AMD operates research laboratories, classrooms and medical treatment facilities in Texas, Ohio and New Mexico—each of which has some unique facility or capability. At these institutions, Air Force scientists are seeking to evaluate future operational situations that will require manned

General James Ferguson, USAF, is Commander, Air Force Systems Command, with responsibility for providing the weapon systems and meeting the technological needs of the total Air Force mission. Before assuming his present command, he served as Deputy Chief of Staff for Research and Development at Headquarters, U.S. Air Force. General Ferguson is also the Director of the Manned Orbiting Laboratory Program, in addition to his duties as Commander of the Systems Command.

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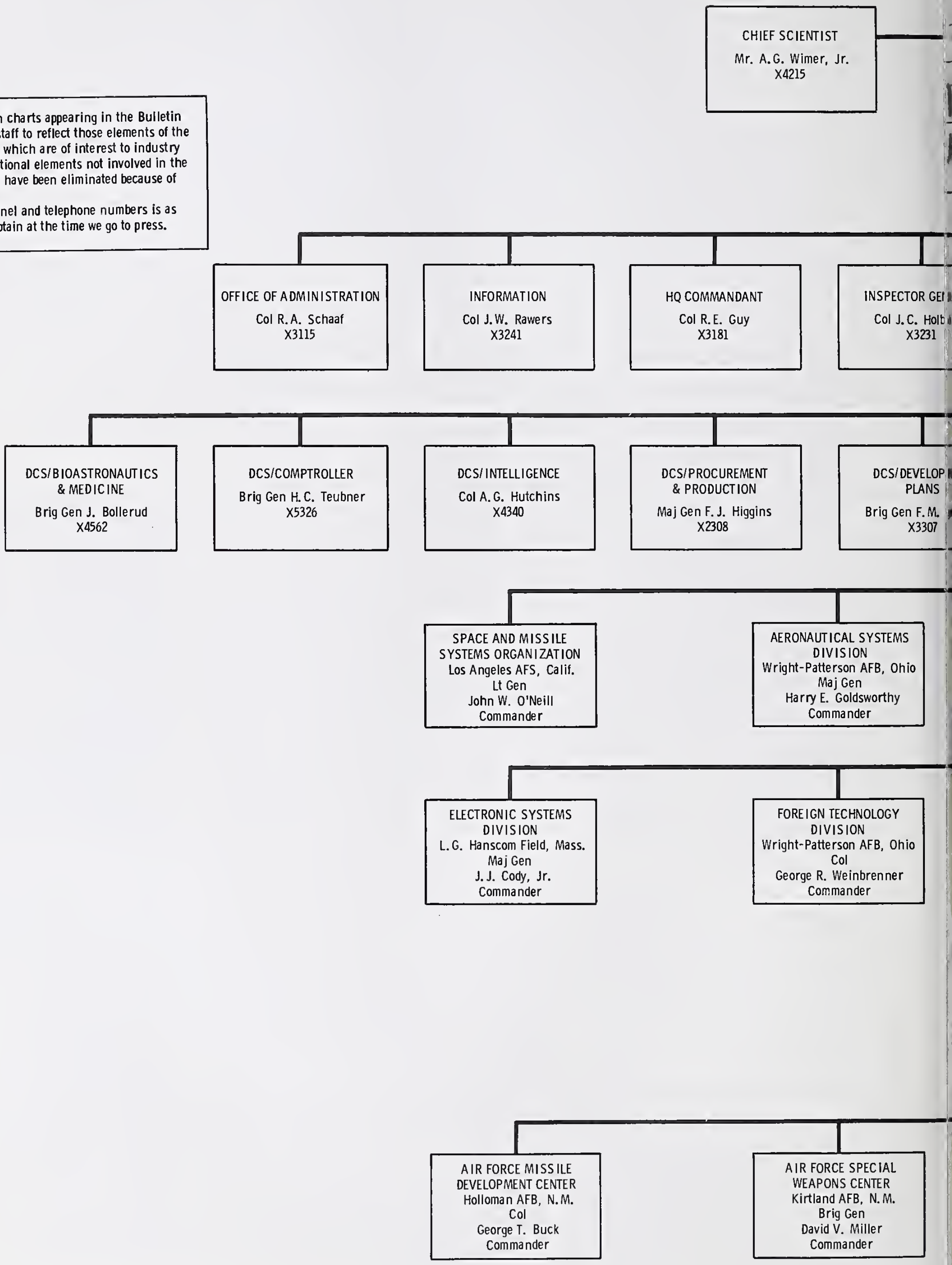
[1] *Editor's Note: Subsequent issues of* Defense Industry Bulletin *will carry articles about four of the major subordinate elements of the Air Force Systems Command. These are the Space and Missile Systems Organization (SAMSO), the Aerospace Medical Division (AMD), the Electronic Systems Division (ESD), and the Aeronautical Systems Division (ASD).*

HEADQUARTERS

Editor's Note: Organization charts appearing in the Bulletin are edited by the editorial staff to reflect those elements of the various DOD organizations which are of interest to industry representatives. Organizational elements not involved in the DOD-industry relationship have been eliminated because of space limitation.
The information on personnel and telephone numbers is as current as is possible to obtain at the time we go to press.



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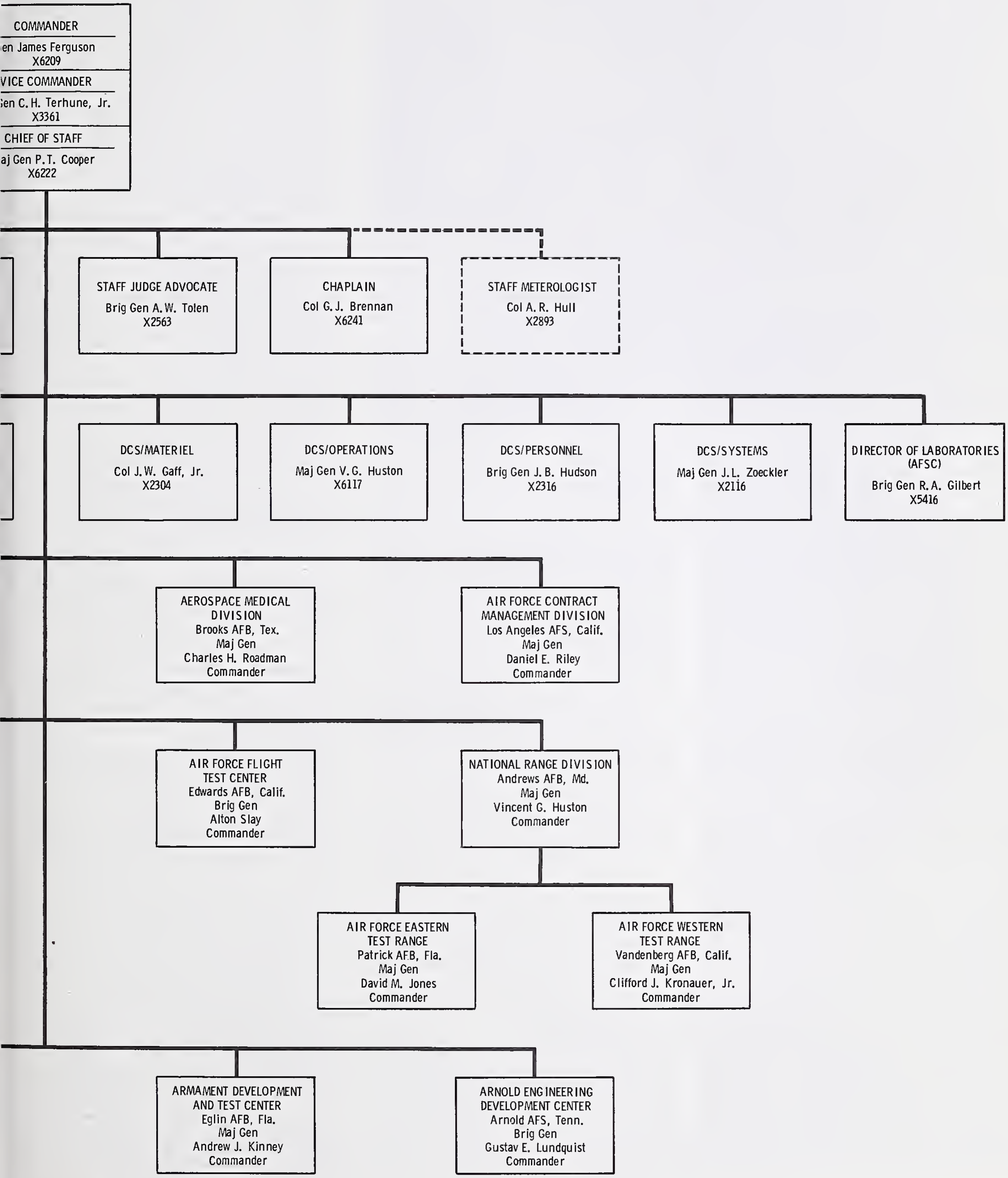
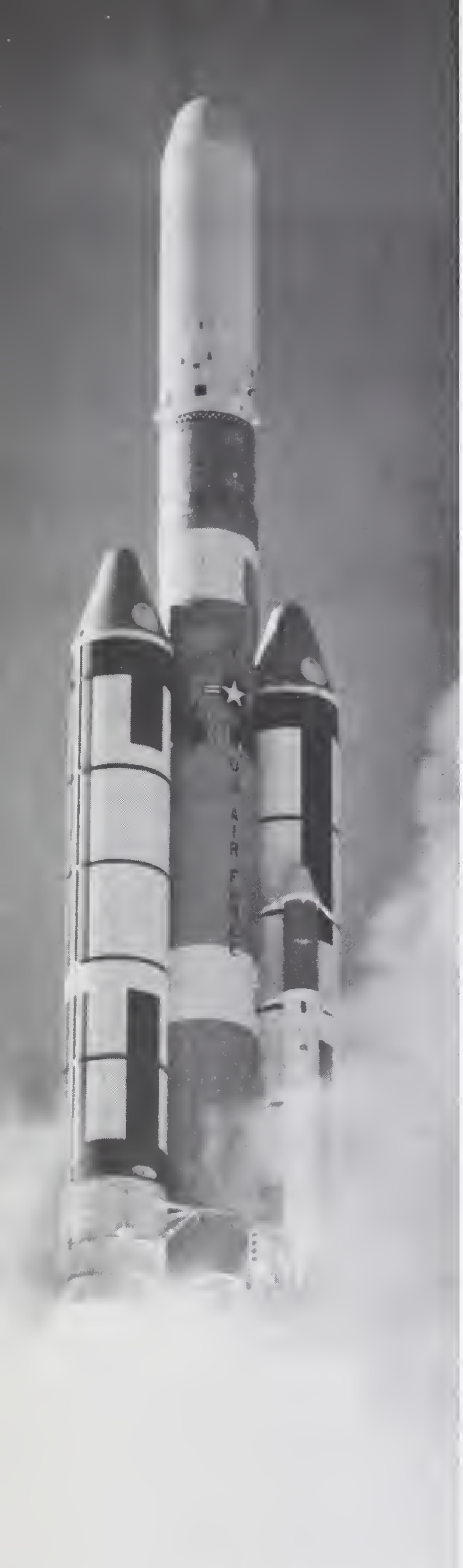




Titan IIIC, the Air Force's largest booster, pushes skyward from Cape Kennedy with the Tactical Communications Satellite (TACSAT No. 1) inside.

spacecraft, to define potential medical hazards that man might face in operating these spacecraft, and to devise methods and medicines to counteract such hazards and insure maximum crew performance.

Director of Laboratories (DOL), Andrews AFB, Md.

Prior to 1961, Air Force capability for in-house research and development was extremely limited. In June and July 1961, both the House Committee on Appropriations and the Senate Committee on Government Operations expressed concern. That July President Kennedy launched an investigation, and the following October Secretary of Defense McNamara stated that in-house laboratories must be supported and would be used as a primary means of carrying out Defense Department programs.

The Air Force approach to solving the situation was the consolidation of its research and technology activities into a streamlined organization to rebuild in-house technical competence. In July 1962, the Research and Technology Division (RTD) was created within the Air Force Systems Command, and later evolved into the Director of Laboratories (DOL) in AFSC headquarters.

The DOL is responsible for the creation of a broad base of research and technology, which can be applied to the maintenance of effective operational forces in being. It is concerned with the timely modernization of these forces, and the exploitation of technology to meet future Air Force requirements for advanced aerospace systems.

The DOL is responsible for more than 1,700 research and engineering contracts valued at $440 million. Yearly operating funds of $328 million have been required to operate the laboratories, and an additional $140 million has been expended yearly on behalf of other government agencies engaged in research and development work. The technical facilities of the nine laboratories are valued at more than $400 million.

Each laboratory is charged with planning and executing AFSC exploratory and development programs, and serves as the Systems Command focal point for all available information in its assigned areas of technology.

The laboratories, their locations and missions are:

- **Rome Air Development Center (RADC), Griffiss AFB, N.Y.** The Rome Air Development Center (RADC) is the largest of the laboratories in manpower strength, with more than 1,500 scientists, engineers and supporting personnel.

Its involvement in the electromagnetic areas of transmission and reception is essentially in ground communications. Satelliting the RADC complex are 15 remote facilities within an approximate radius of 200 miles from Griffiss AFB.

RADC accomplishes research, development and test of electronic systems for detection, control, identification and countermeasures; navigation, communications and data transmission systems; and associated components and related automatic flight equipment.

- **Air Force Weapons Laboratory (AFWL), Kirtland AFB, N.M.** The Air Force Weapons Laboratory (AFWL) works closely with the Air Force Special Weapons Center (AFSWC) at Kirtland AFB, N.M., and the Atomic Energy Commission in planning, managing and conducting exploratory and advanced development programs associated with nuclear and other non-conventional advanced weapons, and their applications.

The nearly 500 scientists and engineers there study the effects, delivery techniques and hazards of these weapons, and the utilization of nuclear power. Facilities are composed of the main laboratory complex at Kirtland AFB and two facilities at adjacent Sandia Base.

- **Air Force Rocket Propulsion Laboratory (AFRPL), Edwards AFB, Calif.** "Forging tomorrow's rocket propulsion systems today," the Air Force Rocket Propulsion Laboratory (AFRPL), the largest tenant facility at Edwards AFB, is a $150-million aggregation of high-thrust rocket engine test stands and complex research equipment.

Highly specialized Air Force and contractor development engineers at this laboratory perform research on rocket propulsion systems in five major areas: liquid rocket technology, solid rocket technology, development of liquid and solid rocket propellants, advanced propulsion techniques, and development of rocket propulsion instrumentation and techniques.

AFRPL scientists and engineers had leading roles in development of propulsion systems for the Thor, Atlas, Minuteman, Titan and Blue Scout programs, and rockets for the X–15 research aircraft.

- **Air Force Armament Laboratory (AFATL), Eglin AFB, Fla.** The crisis in Southeast Asia pointed up the need for high priority development of non-nuclear munitions. The Air Force Armament Laboratory (AFATL) provides the Air Force with a technical capability tailored to meet many of the urgent demands generated by the current conflict.

The titles of AFATL's five divisions reveal the scope of its endeavors: engineering, ballistics, weapons, biological-chemical, and targets and missiles. Most often on center stage these days is the Weapons Division, which is responsible for concept formulation and design of conventional armament hardware. From this division come most of the weapons that are being used in Vietnam and the weapons that will be used tomorrow.

A vigorous program is being carried on to seek out and exploit new phenomena and techniques that may provide significant advances in the state of the art in such areas as shock hydrodynamics, detonation physics, the chemistry of explosives, warheads, and explosive fuel munitions.

- **Air Force Human Resources Laboratory (AFHRL), Brooks AFB, Tex.** The Air Force Human Resources Laboratory (AFHRL), the newest Systems Command subdivision, went into operation July 1, 1968, designed to be the focal point for Air Force research and development effort to satisfy technology needs in human resources education, training and management.

The laboratory is charged with planning and executing research, and exploratory and advanced development programs in personnel selection, management and career development; personnel motivation and retention; personnel force structures and composition; training techniques and equipment; personnel requirements for advanced weapon systems; and career education.

A multi-function, minimum-reaction space tool is tested in a weightless experiment at the Aero Propulsion Laboratory.

- **Air Force Aero Propulsion Laboratory (AFAPL), Wright-Patterson AFB, Ohio.** The Air Force Aero Propulsion Laboratory (AFAPL) is a large complex concerned with air-breathing, electric and advanced propulsion systems. It also deals with fuels and lubricants, power generation and aerospace support, providing technological input to Air Force decision makers and offering quick-reaction solutions to specific problems.

The laboratory is doing exploratory and advanced development work on devices, such as turbojets, ramjets and scramjet engines, and is working on capabilities for operations in space.

AFAPL plans for far into the future. Its scientists speak of speeds of more than Mach 10 in terms of "when" not "if." It has people actively engaged on proposals forecasting propulsion systems 20 years hence.

- **Air Force Materials Laboratory (AFML), Wright-Patterson AFB, Ohio.** The Air Force Materials Laboratory (AFML) is the Air Force's oldest laboratory, celebrating its 51st birthday last December. It strives "to evolve new materials and materials production technology, and encourage rapid utilization of new materials in Air Force applications."

In servicing hardware—space and reentry vehicles, aircraft and missiles—the laboratory tests its materials against the properties of stress, vibration, impact, fatigue, time, high and low temperatures, corrosion, oxidation and weight savings.

Some of its specific objectives are to develop and test improved metals, plastics, adhesives, graphites, ceramics and composites for structures and propulsion; elastomers for seals and sealants; electrical, electronic and magnetic materials, materials for deceleration devices and expandable structures; and protective techniques.

- **Air Force Avionics Laboratory (AFAL), Wright-Patterson AFB, Ohio.** "Avionics" is a word coined during World War II, when it was discovered that an aircraft without "round-the-clock" capability was only a partially effective weapon. Radar was applied to the bomb-directing and fire control functions, and electronic circuits were developed to assist in navigation, aerodynamic and engine control, and surveillance—in fact, to most of the aircraft systems.

Today avionics is formally described as "the development of electrical and electronic devices for use in aviation, especially of electronic control systems for aircraft and airborne weapons."

Among advanced programs assigned the Air Force Avionics Laboratory are avionics communications, bionics, lasers, molecular electronics, electromagnetic vehicle environment, camouflage, antennas, electromagnetic warfare, navigation, guidance, weapon delivery, and aerospaceborne surveillance.

- **Air Force Flight Dynamics Laboratory (AFFDL), Wright-Patterson AFB, Ohio.** At the Air Force Flight Dynamics Laboratory (AFFDL) we strive for advancement of technology needed in the design of future flight vehicles for all foreseeable needs. Work performed at this laboratory is principally in the areas of flight control, flight mechanics, vehicle dynamics, vehicle equipment, V/STOL and structures. AFFDL is participating in the evolution of the AX, F-15 and V/STOL system programs, both in-house and through prospective contractors. It works with all Military Services to establish structural dynamics criteria.

Four of the laboratory's prime facilities are considered national in scope, having "sole or unique technical characteristics." One of these is the Sonic Fatigue Facility. The Federal Aviation Agency sponsors many tests conducted here, including human tolerance limits to high sound levels.

Developing and Procuring Advanced Aerospace Systems

At our three systems divisions, AFSC is applying advanced technology to the development, acquisition, installation and test of Air Force electronic command, control and communications systems; development and acquisition of aeronautical systems and related equipment; and to managing all Air Force ballistic and space systems, present and future.

Electronic Systems Division (ESD), L.G. Hanscom Field, Mass.

In this aerospace age of 18,000-m.p.h. missiles and weapons of tremendous destructive power, the age-old problem of communicating information has taken on new significance. The nature of an attack, either from missiles of an infinite variety or high performance aircraft, must be quickly ascertained, communicated, and displayed to commanders.

The Electronic Systems Division (ESD) designs, procures, tests, installs and checks electronic systems for use by such organizations as the Strategic Air Command, Tactical Air Command, Air Force Communications Service, Air Weather Service and the North American Air Defense Command. Specialized command centers enable military commanders to assess the total defense situation and the status of Air Force retaliatory forces.

From Europe to the Pacific and throughout the North American continent, ESD systems collect information about aircraft movements, missile launchings and man-made objects in space. The data collected are transmitted via tropospheric, microwave, cable, radio, or other means to the command centers where computers process the millions of bits of information. Information immediately vital to the decision makers is displayed to aid in the decision-making process.

Aeronautical Systems Division (ASD), Wright-Patterson AFB, Ohio.

Cape Kennedy Air Force Station's "ICBM Row." The cape is Station No. 1 on the Air Force Eastern Test Range.

The Aeronautical Systems Division (ASD) is the largest of our subordinate units. It annually spends about $5 billion—more than all the other elements of the Systems Command combined. Most ASD dollars are earmarked for developing and acquiring airplanes that vary in size from small trainers to the largest transports. The division manages aircraft programs contracted to industry from their conception through the various stages of development, testing and production.

ASD's role in aircraft development dates back to the beginning of manned flight itself. The first U.S. Government aircraft ever purchased was bought on contract from Orville and Wilbur Wright of nearby Dayton. The Wrights' $25,000 contract for "one heavier-than-air flying machine" set the pattern for government-industry cooperation that has continued for more than 40 years. Today ASD's contracts represent a total obligation of more than $10 billion.

The division currently manages some 50 aircraft and non-ballistic missile systems in support of the full range of Air Force operational missions and future requirements.

Space and Missile Systems Organization (SAMSO), Los Angeles AFS, Calif.

In 1954 a handful of Air Force officers met in a schoolhouse in Inglewood, Calif., just a few miles from the present complex at Los Angeles Air Force Station, where the Space and Missile Systems Organization (SAMSO) is located. Their mission was to provide this nation with an intercontinental ballistic missile (ICBM) capability in the shortest possible time.

From this nucleus grew the Space and Missile Systems Organization, the management agency for most Air Force ballistic and space systems, present and future. Almost three-fourths of the space flights undertaken by the Free World have been launched by SAMSO-developed boosters and SAMSO aerospace test wing crews.

Major current programs include the development and deployment of advanced Minuteman weapon systems; conceptual studies of an advanced ICBM; research and development work in Advanced Ballistic Reentry Systems (ABRES); space boosters for heavy and multiple payloads; certain phases of the Manned Orbiting Laboratory (MOL); assisting in the Defense Satellite Communications System; studies in space escape and rescue; and launch of a wide variety of space and planetary probes.

National Range Division (NRD), Andrews AFB, Md.

From its headquarters, the National Range Division (NRD) develops, controls, operates and maintains the Air Force Eastern (AFETR) and Western Test Ranges (AFWTR), in support of national ICBM and space programs. The primary responsibility of the headquarters is central planning of range development, insuring compatibility of equipment, and the control and balancing of resources. The responsibility of operations and maintenance in support of specific space and missile programs rests with the AFETR and AFWTR commanders.

- **Air Force Eastern Test Range (AFETR), Cape Kennedy AFS, Fla.** AFETR extends 10,000 miles downrange from Cape Kennedy to the Indian Ocean, with island stations at Grand Bahama, San Salvador, Grand Turk, Antigua and Ascension. Last station in the chain is at Pretoria, Republic of South Africa. Radar, optical and continuous wave devices track test vehicles, while telemetry equipment records vital information of the flight performance. Especially instrumented Air Force aircraft and ships are used to fill in the gaps between the island tracking stations.

A military-civilian work force of about 15,000 provides support services to all range users in their missile and space exploration projects.

- **Air Force Western Test Range (AFWTR), Vandenberg AFB, Calif.** Complementing AFETR to provide a national range with global capability, tracking and data gathering sites of the Air Force Western Test Range (AFWTR) are located at Vandenberg AFB and Pillar Point in the United States, and Wheeler AFB, Hawaii; and Eniwetok Island in the Pacific Ocean. In addition, data gathering facilities, at Point Mugu, Calif.; Kaena Point and Kokee Park, Hawaii; and Kwajalein, Wake and Midway Islands, are operated by other government agencies.

AFWTR specializes in polar orbit launches and supports the operational training launches of the Strategic Air Command (SAC). Eniwetok Atoll, situated in the northern Marshall Islands 2,380 miles southwest of Honolulu, serves as the main impact area for SAC's ICBMs launched from Vandenberg. Eniwetok's two main tasks are to score the accuracy of reentry vehicles and to recover the vehicles from the ocean.

Performance measurement falls into two categories: metric trajectory measured by ground sensors, and telemetry transmitted from the launch vehicle.

Air Force Contract Management Division (AFCMD), Los Angeles AFS, Calif.

To satisfy today's expanding range of system requirements in the face of increasingly stringent budget restrictions, we must insure a full dollar's value for every dollar spent. We strive for balance in allocating available resources between systems development and a sound technological base; and we must achieve effective, efficient management in both endeavors.

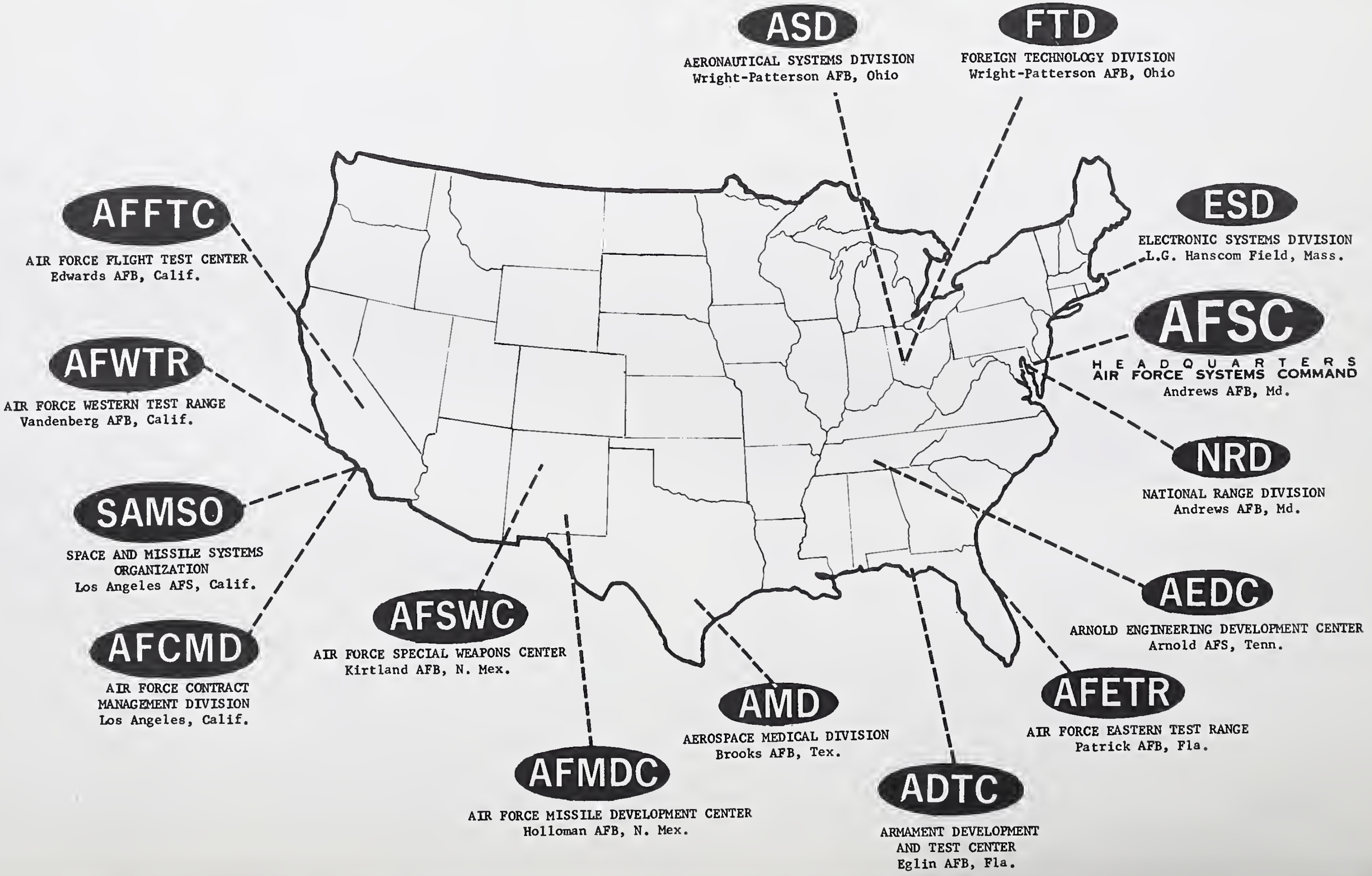
To meet this requirement and to supervise and manage performance on government contracts at facilities assigned to the Air Force for plant cognizance, the Air Force Contract Management Division administers thousands of contracts for DOD and other government agencies.

Twenty-three Air Force Plant Reresentative Offices (AFPROs), located at contractors' facilities, provide on-the-spot representation and progress reports on the status of work at each plant. Close attention is paid to reliability, cost control, and adherence to schedules to assure that the items under contract are produced economically and in accordance with contractual requirements.

Test and Evaluation of Systems and Subsystems

Our research and test centers conduct tests and evaluations of manned aircraft and aerospace vehicles; air-to-air missiles and drones; high speed captive sled track missiles; nuclear effects simulation; aeronautical weapons and non-nuclear munitions; and atmospheric, ballistic, orbital and space flight simulations.

AIR FORCE SYSTEMS COMMAND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Wright-Patterson AFB, Ohio
FTD
FOREIGN TECHNOLOGY DIVISION
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AFFTC
AIR FORCE FLIGHT TEST CENTER
Edwards AFB, Calif.
ESD
ELECTRONIC SYSTEMS DIVISION
L.G. Hanscom Field, Mass.
AFSC
HEADQUARTERS
AIR FORCE SYSTEMS COMMAND
Andrews AFB, Md.
AFWTR
AIR FORCE WESTERN TEST RANGE
Vandenberg AFB, Calif.
NRD
NATIONAL RANGE DIVISION
Andrews AFB, Md.
SAMSO
SPACE AND MISSILE SYSTEMS ORGANIZATION
Los Angeles AFS, Calif.
AFSWC
AIR FORCE SPECIAL WEAPONS CENTER
Kirtland AFB, N. Mex.
AEDC
ARNOLD ENGINEERING DEVELOPMENT CENTER
Arnold AFS, Tenn.
AFCMD
AIR FORCE CONTRACT MANAGEMENT DIVISION
Los Angeles, Calif.
AMD
AEROSPACE MEDICAL DIVISION
Brooks AFB, Tex.
AFETR
AIR FORCE EASTERN TEST RANGE
Patrick AFB, Fla.
AFMDC
AIR FORCE MISSILE DEVELOPMENT CENTER
Holloman AFB, N. Mex.
ADTC
ARMAMENT DEVELOPMENT AND TEST CENTER
Eglin AFB, Fla.

The X–24 rocket-powered manned lifting body is being tested at AFFTC in program to explore flight characteristics of lifting bodies, wingless flight vehicles which derive lift from their shape alone.

Air Force Special Weapons Center (AFSWC), Kirtland AFB, N.M.

At Air Force Special Weapons Center (AFSWC), the task is to make certain that Air Force missiles, aircraft, and command and control systems can survive the effects of nuclear explosions; and that no enemy action, offensive or defensive, can prevent Air Force strategic weapons from reaching their targets.

The center analyzes every component of an operational weapon system in all conceivable nuclear explosion environments from launch to target. It simulates explosion phenomena by non-nuclear methods which artificially create effects like shock and blast waves, the electromagnetic pulse, and transient radiation.

To carry out its nuclear development responsibilities, the center flight tests new equipment, including ballistic cases, bomb suspension and release equipment, arming and fusing devices, and an air-launched, air-recoverable, nuclear explosion detection rocket. It operates a large, well-equipped environmental test laboratory with sand, dust, humidity, temperature and vacuum chambers. Its fabrication facilities include one of the nation's finest experimental machine shops and microelectronics/instrumentation laboratories.

Air Force Missile Development Center (AFMDC), Holloman AFB, N.M.

Located on the edge of the White Sands Missile Range, the Air Force Missile Development Center (AFMDC) has an unusually diversified set of tasks. Among other responsibilities, it conducts and supports the test and evaluation of airborne missiles, target drones, aircraft fire control systems, missile reentry vehicles and aids, and guidance systems.

It operates the Central Inertial Guidance Test Facility, which has advanced equipment for testing gyroscopes, accelerometers and entire guidance systems. It also operates the Radar Target Scatter Site (RATSCAT) facility to collect characteristic radar "signatures" which are reflected from weapon systems, nose cones, decoys and aerospacecraft.

Probably one of the best known test items under AFMDC's direction is the nation's longest, high-speed test track, a seven-mile long "space age railroad" used in testing missile configuration, the effects of rain erosion, aircraft seat ejection systems, and guidance systems. It is the most precisely aligned and completely instrumented, high-speed test track in the Free World.

Armament Development and Test Center (ADTC), Eglin AFB, Fla.

The need for non-nuclear, conventional warfare capabilities, pointed up by the war in Southeast Asia, brought with it an upsurge of activity at Armament Development and Test Center (ADTC), located at Eglin AFB, Fla., the Air Force's largest base.

ADTC develops, tests and acquires conventional munitions for counterinsurgency and limited warfare. Aircraft systems, subsystems, allied equipment, guns, bombs, rockets, targets and drones, new high-power frequency diversity early warning radars, airborne electronic countermeasures equipment—all are tested and evaluated on eight test ranges, eight auxiliary airfields, and the large Eglin Gulf Test Range.

Its Climatic Laboratory, the world's largest environmental testing facility is a huge, "deep-freeze oven" where aircraft, missiles and support items of equipment can be functionally tested and exposed to any simulated arctic or tropic environment. The laboratory can be controlled to a frigid 5 degrees Fahrenheit below zero or to a baking 165 degrees above zero.

Air Force Flight Test Center (AFFTC), Edwards AFB, Calif.

Nearly every kind of aircraft used by the Air Force since 1946 has been tested at the Air Force Flight Test Center (AFFTC), Edwards AFB. Here experimental and acceptance flight testing for aircraft and aerospacecraft entering the inventories of the Air Force, its sister Services and other governmental agencies is conducted to determine whether they meet established requirements and design objectives.

The supersonic age of flight began at the center's relatively isolated 300,000 acres with the X–1 rocket plane in 1947, and has progressed through the now famous X–15 manned research rocket plane and the X–24 rocket-powered lifting body, forerunners of the aerospacecraft of the future. More conventional aircraft under test at Edwards include the A–7, F–111, SR–71 and YF–12. Aided by natural as well as constructed facilities, AFFTC's 15,000-foot man-made runway is supplemented by dry lake beds with natural runways up to 13 miles long. Extremely good weather allows flight testing up to 350 days per year.

AFFTC is also the home of the Aerospace Research Pilot School (ARPS), the only training facility of its kind in the Free World, where pilots for tomorrow's aerospacecraft are taught to master the environment of space.

Arnold Engineering Development Center (AEDC), Arnold AFS, Tenn.

The Arnold Engineering Development Center (AEDC) is a $400-million "national resource" situated on a 40,000-acre reservation near Tullahoma, Tenn. It maintains and operates high-performance wind tunnels, high-altitude propulsion system test cells, and space environmental chambers in which large or full-scale models of aircraft, missiles, satellites, and space vehicles, and their propulsion systems can be tested under conditions simulating a broad range of flight environments.

The center supports practically every high-priority aerospace program of the nation, including those for the National Aeronautics and Space Administration, the Army and Navy. With the capability to simulate flight conditions from sea level to space, the center's technical facilities present major state-of-the-art changes in themselves. Yet, these facilities must be in existence prior to the systems they will test, and whose progress they can pace or appreciably accelerate.

Major facilities include:

- **von Karman Gas Dynamics Facility** for testing aerodynamic scale models under extreme flight conditions.
- **Rocket Test Facility** for testing full-scale propulsion systems for aircraft, missiles and space vehicles under simulated operating conditions.
- **Large Rocket Facility** for testing the larger liquid and solid propellant rocket engines.
- **Propulsion Wind Tunnel** for testing full-scale aircraft and large-scale missile models, together with their operating propulsion systems, under realistic flight conditions.
- **Aerospace Environmental Facility** for simulating space environments up to 300 miles above the earth's surface.

A C–141 Starlifter undergoes freeze tests in the Climatic Laboratory at the Armament Development and Test Center, Eglin AFB, Fla.

A Glance Ahead

Air Force Systems Command is charged with the responsibility of being in two places at once—on the frontier of future opportunity and on the doorstep of present problems. Looking for new technologies to overcome present problems and ways to meet the difficulties of the future provide the basis for the command's research and development charter. Put simply, if we expect our 1980 weapon systems to be preeminent in overall effectiveness, we must be sure that contributing laboratory projects are on the bench in 1970.

In looking to the future, we have already selected certain items to be carried through their development to at least an initial operational capability. These include the Airborne Warning and Control System (AWACS), the Advanced Manned Strategic Aircraft (AMSA), the F–15 air superiority fighter, the AX attack aircraft and the Light Intratheater Transport (LIT).

Advanced development programs, designed to demonstrate feasibility of critical components or techniques necessary to the full development of some other systems, will also receive high priority. Examples include the development of overland radar directly keyed to the success of AWACS, and studies of turbine engines for the F–15 aircraft.

In the development of the new F–15 tactical fighter, the importance of research and exploratory developments on long lead-time hardware and test facilities is dramatically illustrated. If we had not in past years laid down facilities capable of testing this airplane, it would now be too late.

With the work being done now in our laboratories, we hope to forge new breakthroughs in such critical areas as laser technology and composite materials. In procurement, the philosophy of contract definition in hardware—what could be called a competitive "initial development"—can allow us to base our source selection on a hundred cubic feet of hardware rather than a hundred cubic feet of paperwork. The benefits of this approach will result in decisions made upon hard technical data, simulated competition, and a lowered risk rate in meeting calendar commitments for initial operational capability.

AFSC's goals and challenge are one and the same—TECHNOLOGY—for delivering the goods needed today and preparation for those required in the future. With the support of American industry, I am confident the command can and will meet this important test.

BIBLIOGRAPHY

DEFENSE PROCUREMENT CIRCULARS

Distribution of Defense Procurement Circulars is made automatically by the U.S. Government Printing Office to subscribers of the Armed Services Procurement Regulation (ASPR).

Defense Procurement Circular No. 68, March 17, 1969. (1) Cost Principles—Independent Research and Development Costs and Bid and Proposal Expenses. (2) Service Contracts—Wage Determinations. (3) Small Business Size Standards. (4) Evaluation of Options. (5) Appropriation Act Restrictions on Procurement of Foreign Supplies and Services. (6) Cost Principles—Recruitment Costs.

RESEARCH REPORTS

Organizations registered for service may obtain microfiche copies of these documents without charge from:

Defense Documentation Center
Cameron Station
Alexandria, Va. 22314

All organizations may purchase microfiche copies (65¢) or full-size copies ($3) of the documents (unless otherwise indicated) from:

Clearinghouse for Federal and Scientific Information
Department of Commerce
Springfield, Va. 22151

Detection of Atmospheric Oxygen Using a Tuned Ruby Laser. Atmospheric Sciences Laboratory, White Sands Missile Range, N.M., June 1968, 37 p. Order No. AD–667 389.

Low Temperature Techniques for Electron Irradiations. Air Force Cambridge Research Laboratories, Bedford, Mass., Oct. 1968, 54 p. Order No. AD–678 102.

Desigh Considerations for Crystal Resonators with Prescribed Mode Suppression. U.S. Army Electronics Command, Fort Monmouth, N.J., Sept, 1968, 30 p. Order No. AD–678 488.

Origin of the Dispersion of the Complex Magnetic Permeability in Spinel Ferrites. U.S. Army Electronics Command, Fort Monmouth, N.J., July 1968, 120 p. Order No. AD–678 485.

Air Traffic Control Systems. Defense Documentation Center, Alexandria, Va., Oct. 1968, 274 p. Order No. AD–679 220.

Fly-by-Wire Flight Control Systems. Air Force Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio, Sept. 1968, 39 p. Order No. AD–679 158.

A Solution of Shock-Induced Boundary Layer Problems by an Integral Method. Aerospace Corp., San Bernadino, Calif., for the Air Force, Aug. 1968, 41 p. Order No. AD–679 625.

Consideration of Simulation Parameters for Blunt Thick Bodies in Rarefied High-Speed Flows. ARO, Inc., Arnold Air Force Station, Tenn., Nov. 1968, 25 p. Order No. AD–678 159.

Sudden Acceleration of a Laminar Boundary Layer by a Moving Belt. Aerospace Corp., El Segundo, Calif., for the Air Force, July 1968, 63 p. Order No. AD–678 956.

Holographic Techniques for the Study of Dynamic Particle Fields. ARO, Inc., Arnold Air Force Station, Tenn., for the Air Force, Nov. 1968, 27 p. Order No. AD–678 858.

Potentiostatic Current-Potential Measurements on Iron and Platinum Electrodes in High-Purity Closed Alkaline Systems. Naval Research Laboratory, Washington, D.C., Aug. 1968, 18 p. Order No. AD–676 734.

Thermal Degradation of Polyesters, Part I: Aliphatic Polymers. Air Force Materials Laboratory, Wright-Patterson AFB, Ohio, Aug. 1968, 52 p. Order No. AD–678 883.

Nondestructive Testing for Void Content in Glass-Filament-Wound Composites. Naval Research Laboratory, Washington, D.C., Oct. 1968, 19 p. Order No. AD–679 673.

Determination of the Ester Composition of Neopentyl Polyol Ester Lubricants. Naval Research Laboratory, Washington, D.C., Oct. 1968, 19 p. Order No. AD–679 572.

Effect of Solubilized Methanol on Micelle Size in a Nonpolar Solvent. Naval Research Laboratory, Washington D.C., Sept. 1968, 18 p. Order No. AD–678 364.

Evaluation of a New Radiographic Image Quality Indicator. U.S. Naval Ordnance Laboratory, White Oak, Md., June 1968, 17 p. Order No. AD–675 009.

A Direct-Shadow Method for Investigating Natural Convection in Water. Harry Diamond Laboratories, Washington, D.C., for the Army, Aug. 1968, 68 p. Order No. AD–679 020.

Microfiche, Microfilm and Related Equipment. Defense Documentation Center, Alexandria, Va., July 1968, 58 p. Order No. AD–675 300.

Anticorrosion Sealing Caps for Mechanical Fasteners. Pacific Missile Range, Point Mugu, Calif., Sept. 1968, 21 p. Order No. AD–679 697.

Atmospheric Turbulence. Defense Documentation Center, Alexandria, Va., Sept. 1968, 456 p. Order No. AD–678 760.

Feasibility Investigation of Plastic Parts for Vented, Nickel-Cadmium Battery BB–607. U.S. Army Electronics Command, Fort Monmouth, N.J., Nov. 1968, 20 p. Order No. AD–680 893.

Surface Treatment of Polymers with Activated Gas Plasma for Adhesive Bonding. Picatinny Arsenal, Dover. N.J., for the Army, Jan. 1968, 33 p. Order No. AD–680 957.

Summary of Specification Requirements for Military Fabrics. Test Methods Development Branch, U.S. Army Natick Laboratories, Natick, Mass., Oct. 1968, 383 p. Order No. AD–680 231.

The Status and Impact of Reliability Methodology. Stanford University, Stanford, Calif., for the Navy, Jan. 1969, 38 p. Order No. AD–681 028.

Mossbauer Study of Dilute Alloys of Iron. U.S. Army Aberdeen Research and Development Center, Aberdeen Proving Ground, Md., Nov. 1968, 48 p. Order No. AD–680 952.

Procedures for Fracture Toughness

(*Continued on page 40*)

Defense Electronics Supply Center

A Dependable Supplier Who Often Gets Personal with Customers

Brigadier General Glen J. McClernon, USAF

A U.S. patrol maneuvers cautiously through the bramble of a Vietnam jungle toward a tiny village identified as a suspected Viet Cong outpost. The eyes of the men search the underbrush for mines and punjii sticks, their ears listen attentively for any foreign sound—a crackling branch, a rustling bush.

Suddenly the area around bursts with enemy weapons fire and the patrol leader signals his radioman to call for support. At a time such as this dependable electronic equipment is of the utmost importance. A time like this emphasizes the importance of government-industry teamwork in providing the Armed Forces with the best in military equipment.

At the Defense Electronics Supply Center (DESC), Dayton, Ohio, where electronic components are managed for defense, space and other programs, the importance of quality is constantly in the foreground of management attention. Established in 1962 under the Defense Supply Agency, DESC currently manages over 600,000 items and has an inventory valued at roughly a half-billion dollars. Its products include such hardware as resistors, capacitors, filters, networks, fuses, circuit breakers, switches, connectors, relays, coils, transformers, crystals, electron tubes, semicounductor devices, audio materiel, antennas, waveguides, synchros and resolvers, plus miscellaneous electronic components.

Most of the items are earmarked for military use by the Army, Navy, Air Force and Marine Corps. However, the center also provides support to an increasing number of Federal civilian agencies, such as the National Aeronautics and Space Administration, Coast Guard, Federal Aviation Administration, Post Office and Maritime Administration.

Because of the vital missions of its customers and the critical applications of its items, DESC's total support—service as well as the supplies themselves—is geared not only toward reliability but response as well. In fact these two ingredients are built into the framework of its operations in order to get quality hardware into the hands of the customer within the shortest time possible.

DESC's reaction capability was tested when a warehorse at DaNang Air Base, Vietnam, was destroyed during the 1968 Tet offensive. Within 24 hours after the attack, some 6,780 requisitions for replacement parts were forwarded to DESC and its sister DSA activity, the Defense General Supply Center in Richmond, Va., where some electronic supply classes are also managed. DaNang officials reported that 94 percent of the requested items arrived within two weeks and the remainder shortly thereafter.

Instant Response to Customer Demands

Certainly such swift service would not have been possible were it not for industry cooperation and DESC's streamlined supply system—a system which permits DESC to react almost instantly to customers demands.

Those DaNang requisitions, for instance, were relayed to DESC over the world's fastest communications system, the Automatic Digital Network (AUTODIN). A high-volume, computer-controlled communications operation, AUTODIN transmits and receives teletype, punch card, and magnetic traffic to and from points throughout the world. It is managed by the Defense Communications Agency and staffed by the Air Force Communications Service. The switching terminal located at DESC automatically processes between 30,000—125,000 messages daily with almost 100-percent accuracy, and handles approximately 98 percent of the center's supply orders.

Companion to AUTODIN at DESC is another communications system managed by the Defense Supply

Brigadier General Glen J. McClernon, USAF, is the Commander, Defense Electronics Supply Center, Dayton, Ohio. Prior to his present command, he was Director of Maintenance Engineering for the Air Force Logistics Command. In previous assignments, General McClernon was Deputy for Production and Director of Maintenance, Sacramento Air Materiel Area; and Director of Maintenance for Air Materiel Area, Pacific Far East Air Force.

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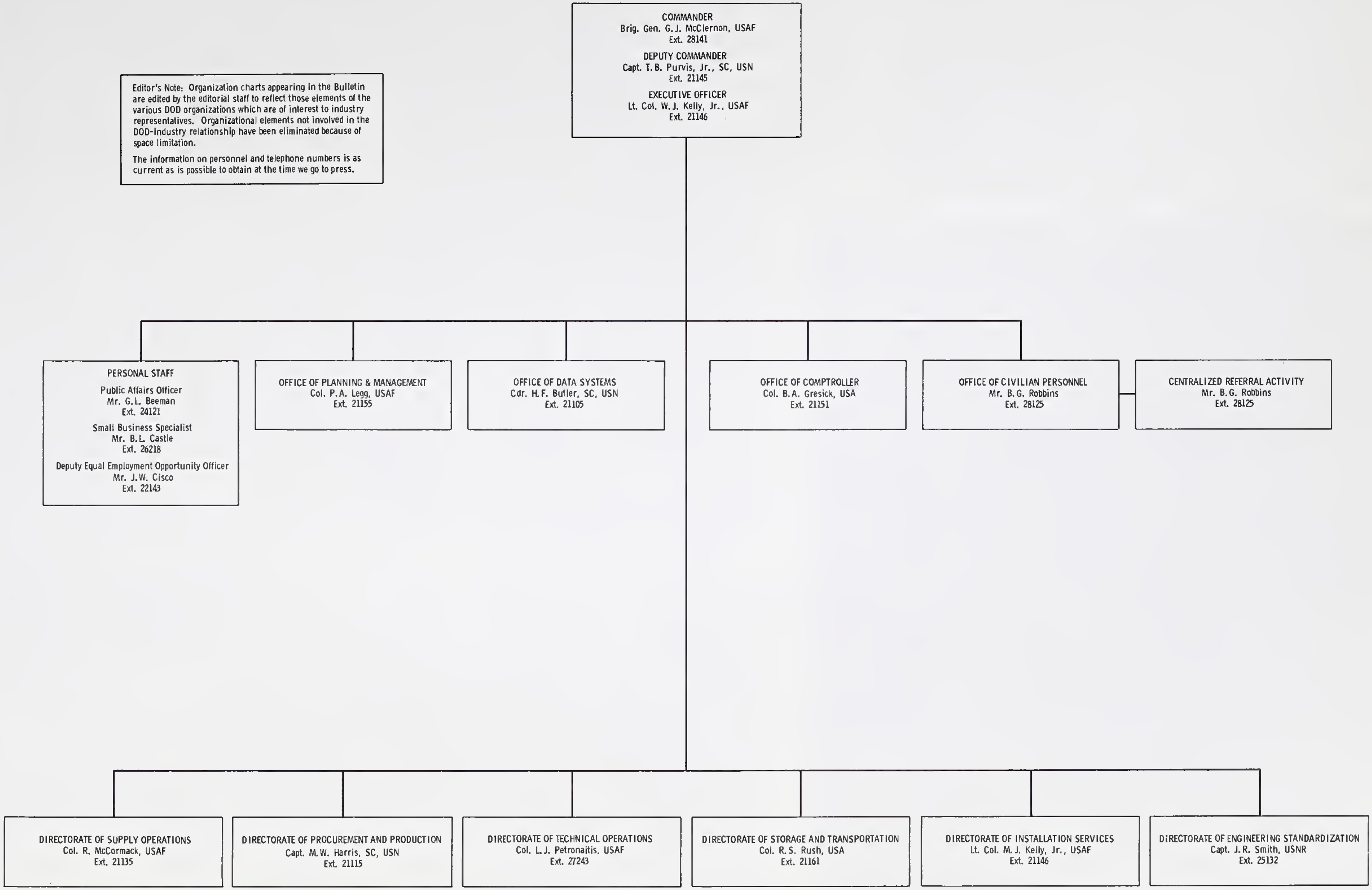
Editor's Note: Organization charts appearing in the Bulletin are edited by the editorial staff to reflect those elements of the various DOD organizations which are of interest to industry representatives. Organizational elements not involved in the DOD-Industry relationship have been eliminated because of space limitation.

The information on personnel and telephone numbers is as current as is possible to obtain at the time we go to press.



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Ext. 25132

Defense Electronics Supply Center

	FY 1968	FY 1967
Procurement (62.2 percent competitive in FY 1968)	$ 198.3 (mil)	$ 280.7
Small Business Contract Awards	$ 43.2 (mil)	$ 74.6
Labor Surplus Area Contract Awards ($10,000 and above)	$ 4.9 (mil)	$ 7.1
Inventory (as of June 30)	$ 520.2 (mil)	$ 486.2
Personnel		
Military (as of June 30)	43	43
Civilian (as of June 30)	3,607	3,839
Requisitions Processed (Gross)	6,488.0 (thous)	6,590.9
DSA Managed Items	647.6 (thous)	605.5
Depot Line Items Received (DSA Material)	330.4 (thous)	411.8
	4.4 (thous) short tons	6.6
Depot Line Items Received (DSA Material)	2,696.3 (thous)	2,927.0
	5.6 (thous) short tons	5.5

Agency, *i.e.*, the Defense Automatic Addressing System (DAAS). This system, which also has a West Coast satellite at McClellan AFB, Calif., is used to group and route supply traffic to its proper destination.

If you can imagine a housewife addressing her Christmas cards, you can appreciate what DAAS means to defense logistics. Most likely, the housewife will research every address and question whether or not some have changed. Then she'll batch all the cards and ready them for mailing. It all takes time.

With automatic addressing, the process—research, verification, batching—is totally automatic. Computers, with up-to-date information on all items and their supply addresses, properly route transactions to their respective destinations, thus preventing misaddressed communications, bottlenecks and other delays.

All DESC requisitions transmitted by the AUTODIN/DAAS network flow directly into the center's data processing complex—an operation commonly regarded as the backbone of the DESC system.

At DESC computers currently receive and fill requisitions, notify warehousemen where to locate stock, map out necessary shipping instructions, and handle financial arrangements related to the transactions. Computers also regulate stock levels throughout the DESC distribution system and provide supply intelligence to key operating elements such as purchasing and item management.

The computers have proven to be handy gadgets for administration, too. They are used to process the civilian payroll plus the personnel management and promotion systems.

Since 1965, DESC computers have also been involved in a special Defense Department placement effort. In conjunction with the Centralized Referral Activity at DESC, the machines find jobs for displaced DOD workers, locate vacancies for civilians returning from overseas assignments, assist activities abroad in recruiting talent located in the United States, and aid Vietnam-era veterans in obtaining Federal jobs. In addition, a fifth system will be introduced this fall to find jobs in Government and industry for retired military enlisted men and officers.

Distribution System

Once the computer completes processing a requisition, DESC's distribution system moves into action. For those requisitions which can be filled from stock (more than 90 percent of the orders are filled from stock waiting in bins), the center employs a nation-wide distribution system to speed materiel to its customers. The bulk of supplies are shipped from principal points at Dayton, Ohio, and Ogden, Utah. Navy Supply Centers at Norfolk, Va., and Oakland, Calif., supply the Fleet and overseas Naval activities, and DOD installations within their immediate areas.

The streamlined depot system at Dayton explains how DESC can fill demands so quickly. Inside warehouses at the center, stockpicking devices, computers, and central location of all high-volume items, collectively, reduce footwork and increase the tempo of supply service. As stock moves through the processing cycle, it proceeds through a mechanized network of more than three miles of conveyor lines and an automated packing operation capable of sorting and consolidating approximately 15,000 items daily.

Intensified, Personalized Management

Though the communications devices, computers and conveyors seemingly do it all, they do have certain shortcomings. With a half-billion dollars invested in inventory and orders arriving at the rate of one every five seconds, supply management at DESC is truly big business. It is obviously too big for a team of supply specialists to properly handle alone, and too sensitive to entrust totally to a machine.

To buttress its supply effectiveness, DESC has negotiated a compromise by parlaying its physical equipment into what might be described as an "intensified and personalized management system." In a sense, it is sort of a checks-and-balances approach to complement automation.

Computers, for example, are invaluable for processing orders, directing shipments, and indicating "buy" when stock levels reach reordering points. However, they lack a few characteristics supply management desperately needs. Computers do not have the capability to rationalize, to analyze. Their decisions are based on data given and they do not take into consideration world conditions and peculiar operational requirements. Consequently, the computer's ability to analyze and to predict customer demands accurately is limited.

Additionally, computers are impersonal, unsympathetic, unable to console the customer who has a supply problem. In any business, whether it is manufacturing, sales, or logistics, customer relations have tangible value.

Here is where the supply specialist and the concept of "intensified and personalized management" enter. The supply expert can review data provided by the computer and rationally make the final decision as to whether or not to reorder a product. The degree and frequency of his analysis, of course, depends entirely on the item involved. On certain commodities where the investment and use is great, he intensifies his review and screens product information almost continuously. With his experience and careful analysis of the facts, the supply specialist can anticipate how much materiel the customer will need in coming months and have stock ready in the bin when requisitions for supplies are received.

Also important to supply management, the specialist is quite personal in his dealings—a soft shoulder, if you will, on which the customer may deposit his problems. He recognizes that not every transaction is routine. A certain number of requisitions do depart from the supply blueprint. In such instances, particularly when the supply situation is critical, the human —the "personalized management approach"—proves himself.

To accommodate such knotty problems as top priority requisitions delayed because of no bin stock, DESC employs its own "special forces team" which assumes command of an order immediately and stays with it until filled. In both the item management and purchasing areas, some of the center's most experienced supply and procurement experts have been assembled—separate from the regular force—to handle these special assignments.

The team aptly demonstrated its value last December when handed the following SOS.:

> **"Request improvement in delivery. . . materiel urgently needed to support Apollo 8 mission scheduled for launch 21 December 1968."**

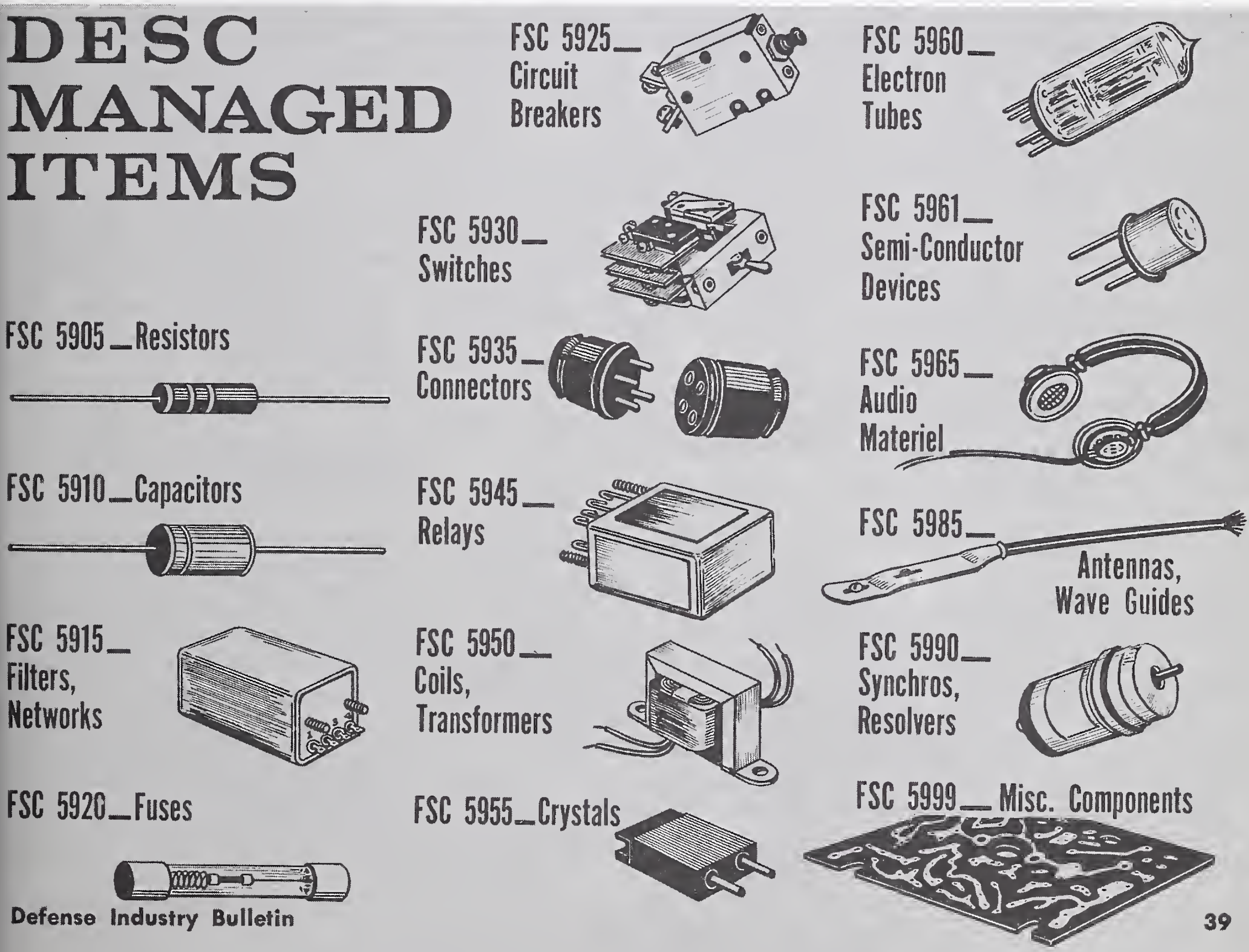
The message, regarding two antennas, was dispatched by Patrick AFB, Fla., and reached DESC at 4 p.m. December 9. It demanded delivery by December 12.

Item management and procurement specialists immediately huddled over the matter and discovered that a contract had just been let for a number of the antennas. However, there were two problems. First, the award was still in the mail and had not reached the contractor; second, the contract contained a requirement for preproduction testing which would require 30 days to complete.

A DESC engineer was called in to resolve the testing technicality. He talked with Patrick AFB officials on the item application and all agreed that, under the pressing circumstances, the requirement could be waived.

The procurement representative then contacted the company president who, when advised of the urgency, volunteered his firm's total cooperation even though the award had not been formally received. Thus, swift attention by DESC personnel and special effort by industry had the antennas at Patrick AFB on time—in

DESC MANAGED ITEMS


FSC 5925 — Circuit Breakers
FSC 5960 — Electron Tubes
FSC 5930 — Switches
FSC 5961 — Semi-Conductor Devices
FSC 5905 — Resistors
FSC 5935 — Connectors
FSC 5965 — Audio Materiel
FSC 5910 — Capacitors
FSC 5945 — Relays
FSC 5985 — Antennas, Wave Guides
FSC 5915 — Filters, Networks
FSC 5950 — Coils, Transformers
FSC 5990 — Synchros, Resolvers
FSC 5920 — Fuses
FSC 5955 — Crystals
FSC 5999 — Misc. Components

fact, one day ahead of the deadline.

The Apollo incident noticeably points out how industry support has helped DESC's reaction capability. Since the center must totally respect the requests of its customers; it, in turn, often places heavy, sometimes inconvenient, demands on its vendors and suppliers. But the cooperation of the electronics industry has never faltered. It has remained steadfast throughout such periods as the Cuban Crisis and the Vietnam buildup. Industry support certainly is one reason why DESC is able to maintain its reputation as a responsive supplier.

Reliability Program

While getting materiel swiftly to the customer is critical, DESC does not overlook the fact that the item must be reliable. Obviously all the investment in a responsive supply system is nullified if the part fails to do its job. Therefore, reliability shares center stage with supply responsiveness at DESC.

The center employs several approaches to assure that its products function satisfactorily. Most of the attention is concentrated in the Directorate of Engineering Standardization, the only organization of its type within the Defense Supply Agency.

Currently, the directorate administers the Defense Department Standardization Program for DESC-managed classes and serves as the standardization assignee activity for DSA. Specifically, as agent for the Military Services, it prepares and coordinates specifications and standards on electronic parts among the Military Departments to assure that item requirements are sufficient to meet the needs of all intended users. It also administers the DOD Qualification Program which requires firms, interested in receiving DESC contracts, to demonstrate that they have both the facilities and capability to produce quality hardware.

The Directorate of Engineering Standardization is additionally involved in keeping pace with the progressive state of the art and new generations of electronic items. It maintains leverage on advancing technology by preparing and maintaining the Established Reliability series of specifications. These documents describe components in terms of established failure rates, and specify large-scale life testing under much more rigorous conditions than those required by conventional specifications.

Engineer Standardization engineers also serve on Parts Control Boards (PCBs) as advisers to the Air Force. The PCBs, which select parts to be used in the design of new systems, consist of representatives from industry, the Air Force and DESC.

The Directorate of Technical Operations represents another area having a sizeable investment in DESC's reliability program. Skilled technicians and engineers in this directorate study failure reports to resolve problems and, frequently, recommend redesign of components to improve quality and lower procurement costs.

Though the past seven years have been banner ones in terms of increased business for DESC, the future promises even greater expansion as each technological advancement brings greater sophistication to the equipment used by center customers. Also further refinements in systems and procedures, particularly in item management and depot operations, can be expected to match the growing demands on the center to provide a larger volume and larger variety of electronic parts.

We are indeed fortunate at DESC to have personnel with a high level of logistics experience, in excess of 18 years, who are capable of and willing to accept the challenges inherent in a rapidly expanding workload and who are determined to do their very best.

Bibliography

(Continued from page 35)

Characterization and Interpretation to Failure-Safe Design for Structural Titanium Alloys. Naval Research Laboratory, Washington, D.C., Dec. 1968, 29 p. Order No. AD–681 043.

Fuel Cell Manpack Power Source. U.S. Army Electronics Command, Fort Monmouth, N.J., Nov. 1968, 26 p. Order No. AD–680 894.

Helicopter Engines and Rotors. Defense Documentation Center, Alexandria, Va., Nov. 1968, 247 p. Order No. AD–680 200.

DOD Procurement Conference Dates Set Through October

The summer series of the Procurement Conference Program has been announced by the Defense Department.

Intended to develop additional competitive sources to meet defense requirements, the program will provide single locations for businessmen and potential contractors to become acquainted with the Federal procurement and contract process.

Business representatives will have the opportunity to meet with specialists on business opportunities from the Military Services, the Defense Supply Agency and civilian agencies. Counseling will be held on the activities of the Defense Contract Administration Services, the Defense Documentation Center, the Defense Specifications Center and other DOD organizations concerned with prime and subcontracting.

At the conferences will be $50 million to $75 million in current Invitations for Bids and Requests for Proposals, including a number of small purchase ($2,500 and under) packages. These will be on hand with Army, Navy, Air Force and Defense Supply Agency counselors.

Dates and locations for the conferences are: May 29, El Paso, Tex.; June 6, Tuscaloosa, Ala.; June 18–19, Anaheim, Calif.; June 23–24, Milwaukee, Wis.; July 25, Oshkosh, Wis.; Sept. 16–18, Charleston, W. Va.; Oct. 13–15, Washington, D.C.; Oct. 29, Tucson, Ariz.; Oct. 31, Pheonix, Ariz.

Army Display To Aid Labor Surplus Areas

In an effort to assist small business firms and both large and small firms in labor surplus areas, the Army Electronics Command has opened a display of electronic items within the production capabilities of such firms.

The display, located at the Philadelphia Procurement Division, 225 S. 18th St., Philadelphia, is open to all representatives of industry, where they can examine the items and learn how they may participate in the program.

ABOUT PEOPLE

DEPARTMENT OF DEFENSE

Lt. Gen. Robert H. Warren, USAF, has been named Dep. Asst. Secretary of Defense (Military Assistance and Sales). The position consolidates the functions previously under the Dir. of Military Assistance and the Dep. Asst. Secretary of Defense (International Logistics Negotiations) of the Office of the Asst. Secretary of Defense (International Security Affairs). **Henry J. Kuss**, former Dep. Asst. Secretary of Defense (International Logistics Negotiations) has entered private business.

RAdm. William E. Lemos, USN, has been selected for Dir. of the Policy Plans Staff in the Office of Asst. Secretary of Defense (International Security Affairs).

Brig. Gen. Richard Ault, USAF, will replace **RAdm. Lester E. Hubbell**, USN, as Dir., Compensation and Career Development, Office of the Asst. Secretary of Defense (Manpower and Reserve Affairs).

Col. Gerald E. Mann, USAF, has been named Chief, Production, Quality and Reliability Div. Defense Supply Agency.

Capt. Nelson J. Sylvester, USN, has been selected as Commander, Pittsburgh District, Defense Contract Administration Service Region, Philadelphia, Defense Supply Agency.

DEPARTMENT OF THE ARMY

Eckhard Bennewitz has been appointed Dep. Comptroller of the Army, succeeding **Thomas J. Moran Jr.**, who was named Dep. Asst. Secretary of Defense (Comptroller) for Program/Budget.

Dr. Robert Frese was named Dir. of the international Joint Engineering Agency of the MALLARD project, Fort Monmouth, N.J.

Dr. John P. Hallowes Jr. has been selected as Chief Scientist of the U.S. Army Missile Command, Huntsville, Ala.

Col. Wallace M. Hanes has been named to succeed **Col. J.J. Wilson** as Chief of Staff, Hq., Strategic Communications Command, Fort Huachuca, Ariz.

Lt. Col. Jess E. Baldwin has been assigned to the U.S. Army Mobility Equipment Research and Development Center, Fort Belvoir, Va., as Dep. Commanding Officer.

Lt. Col. Steven Dorchak Jr. has been named acting Product Manager for the newly designated Air Defense Control and Coordination Systems Product Office, U.S. Army Missile Command, Huntsville Ala.

DEPARTMENT OF THE NAVY

RAdm. Thomas D. Davies has been named Dep. Chief of Naval Material, (Development).

RAdm. Vincent P. Healy has been selected as Dir., Undersea and Strategic Warfare Development Div., Office of the Chief of Naval Operations.

RAdm. John P. Weinel has been chosen to succeed **RAdm. Frederick H. Schneider Jr.** as Dir., Strategic Plans Div., Office of the Chief of Naval Operations. RAdm. Schneider has been named Asst. Dep. Chief of Naval Operations (Plans and Policy).

Brig. Gen. Lawrence F. Snoddy Jr., USMC, has been assigned to the Office of the Chief of Staff of the Marine Corps as Dir., Management Analysis Group.

Capt. Edwin T. Harding has been named Asst. Oceanographer for Environmental Prediction Services, Office of the Oceanographer of the Navy.

Capt. Donald H. Kern has assumed command of the Portsmouth Naval Shipyard, succeeding **RAdm. William C. Hushing.**

DEPARTMENT OF THE AIR FORCE

Lt. Gen. Joseph H. Moore, Inspector General of the Air Force, has been reassigned as Commander, Sixth Allied Tactical Air Force, Allied Command, Europe.

Maj. Gen. Selmon W. Wells has been nominated for promotion to lieutenant general for assignment as Inspector General of the Air Force.

Maj. Gen. Duward L. Crow has been nominated for promotion to lieutenant general for assignment as Comptroller of the Air Force. His successor as Dir. of the Budget, Hq., USAF, will be Dep. Dir. of the Budget **Brig. Gen. William F. Pitts**, who has neen nominated for promotion to major general.

Mar. Gen. William H. Reddell has succeeded **Maj. Gen. Frank E. Rouse** as commander of San Antonio Air Materiel Area, AFLC, Kelly AFB, Tex. Maj. Gen. Rouse has retired.

Brig. Gen. James O. Frankosky has been named Dep. Dir. of Operational Requirements and Development Plans, Office of Dep. Chief of Staff, Research and Development, Hq., USAF.

Brig. Gen. George E. McCord has assumed duties as Chief, Army-Air Force Exchange Service, Dallas, Tex.

Col. C. O. Williams Jr., Commander, Wright-Patterson AFB, Dayton, Ohio, and **Col. William A. Jack**, Asst. Dep. Chief of Staff for Supply, Hq., AFLC, have been nominated for promotion to brigadier general.

Dr. Allen E. Fuhs has been named Chief Scientist, Air Force Aero Propulsion Laboratory, Wright-Patterson AFB, Ohio.

Chief Scientist **Dr. John E. Keto** of the Aeronautical Systems Division, AFSC, has retired.

Col. John D. Calhoun has been named Dep. Dir., Range Operations, Air Force Western Test Range, AFSC, Vandenberg AFB, Calif.

Col. Everest E. Riccioni has been selected as Dep. Dir., Test Operations, Manned Orbiting Laboratory, Space and Missile Systems Organization, AFSC, Los Angeles, Calif.

Col. Henry Simon has been named Dir., Procurement and Production, San Antonio Air Materiel Area, AFLC, Kelly AFB, Tex.

Col. Charles Trueblood has been selected as Dep. Dir., Communications and Electrical Maintenance Operational Support, Hq., AFLC, Wright-Patterson AFB, Ohio.

Col. John B. Voss has been appointed as Dep. Dir. Information, Hq, Strategic Air Command Offutt AFB, Neb.

Maj. Walter J. Burke Jr. has been named Dir. of Information, Electronic Systems Div., AFSC, L.G. Hanscom Field, Mass.

MEETINGS AND SYMPOSIA

MAY

Sixth Annual **Licensing Opportunity Day**, May 21, at the Lower Level of the Chamber Building, 404 S. Bixel St., Los Angeles, Calif. Sponsor: Los Angeles Area Chamber of Commerce. Contact: Lee Pitt, Manager, Aerospace Department, Los Angeles Area Chamber of Commerce, 404 S. Bixel St., Los Angeles, Calif. 90054, phone (213) 482–4010, Ext. 242.

System Performance Effectiveness Meeting, May 21–22, at West Auditorium, Department of State, 23rd and C Sts., N.W., Washington, D.C. Sponsor: Naval Material Command. Contact: George W. Neumann, Executive Secretary, SPE Steering Committee, Naval Ship Systems Command, Code 03511, Washington, D.C. 20360, phone (202) OXford 6–3097.

Second Advanced Marine **Vehicles** and **Propulsion** Meeting (Confidential), May 21–23, Seattle Center, Seattle, Wash. Sponsor: American Institute of Aeronautics and Astronautics. Contact: Meetings Department, American Institute of Aeronautics and Astronautics, 1290 Sixth Ave., New York, N.Y. 10019.

Second **Chemical** and **Molecular** Lasers Conference, May 22–24, at Chase-Park Plaza Hotel, St. Louis, Mo. Sponsors: Air Force Office of Scientific Research, Optical Society of America and McDonnell Douglas Corp. Contact: Capt. John F. Kantak, Air Force Office of Scientific Research, 1400 Wilson Blvd., Arlington, Va. 22209, phone (202) OXford 4–5518.

JUNE

Pattern Recognition Studies Meeting, June 9–10, New York, N.Y. Sponsors: U.S. Army Materiel Command and the Society of Photo-Optical Instrumentation Engineers, Contact: H. Handler, Technical Relations Advisor, U.S. Army Materiel Command, Washington, D.C. 20315, phone (202) OXford 7–6697.

Special Function and Wave Propagation Meeting, June 10–12 at Shoreham Hotel, Washington, D.C. Sponsors: Air Force Office of Scientific Research and the Society for Industrial and Applied Mathematics. Contact: Lt. Col. Paul J. Daily, Air Force Office of Scientific Research, 1400 Wilson Blvd., Arlington, Va. 22209, phone (202) OXford 4–5261.

Planning Challenges of the 1970s in Space and the Public Domain Meeting, June 17–20, at the Brown Palace Hotel, Denver, Colo. Sponsors: American Astronautics Society and the Operations Research Society of America. Contact: Dr. George W. Morgenthaler, General Program Chairman, Martin Marietta Corp., P.O. Box 179, Denver, Colo. 80201, phone (303) 794–5211, Ext. 4557.

Electromagnetic Compatibility Symposium, June 19–20, at Fort Monmouth, N.J. Sponsor: Department of the Army. Contact: Gilbert C. Josephson, Office of the Assistant Chief of Staff for Communications-Electronics, Attn: CEFM–561, Department of the Army, Washington, D.C. 20315, phone (202) OXford 5–7221.

JULY

Sixth International **Physics of Electronics and Atomic Collision** Conference, July 27-Aug. 2, Massachusetts Institute of Technology, Cambridge, Mass. Sponsors: Air Force Office of Scientific Research, Massachusetts Institute of Technology, Office of Naval Research, National Science Foundation, International Union of Pure and Applied Sciences, and the Army Research Office, Durham, N.C. Contact: D.W. Wennersten, Air Force Office of Scientific Research (SRPP), 1400 Wilson Blvd., Arlington, Va. 22209, phone (202) OXford 4–5454; or Dr. Robert Mace, Director, Physics Division, U.S. Army Research Office-Durham, Box CM, Duke Station, Durham, N.C. 27706, phone (919) 286–2285.

AUGUST

Eleventh International **Botanical** Congress, August (dates not yet determined) at the University of Washington, Seattle, Wash. Sponsor: Air Force Office of Aerospace Research. Contact: Dr. Harvey Savely, Air Force Office of Scientific Research, 1400 Wilson Blvd., Arlington, Va. 22209, phone (202) OXford 4–5041; or Dr. John R. Olive, Executive Director, American Institute of Biological Sciences, 3900 Wisconsin Ave. N.W., Washington, D.C. 20016.

Third **Inequalities** Symposium, August (dates not yet determined) University of California, Los Angeles, Calif. Sponsor: Air Force Office of Scientific Research, California University and the Aerospace Research Laboratories. Contact: Dr. R. G. Pohrer, Air Force Office of Scientific Research, (SRMM) 1400 Wilson Blvd., Arlington, Va. 22209, phone (202) OXford 4–5264.

Topology of Manifolds, Aug. 4–15, at the University of Georgia, Athens, Ga. Sponsor: Air Force Office of Scientific Research and the University of Georgia. Contact: Dr. R.G. Pohrer, Air Force Office of Scientific Research (SRMM), 1400 Wilson Blvd., Arlington, Va. 22209, phone (202) OXford 4–5264.

International Conference on Science **of Superconductivity**, Aug. 25–28, Stanford University, Stanford, Calif. Sponsor: Air Force Office of Scientific Research. Contact: Lt. Col. R.A. Houidobre, Air Force Office of Scientific Research (SRPS), 1400 Wilson Blvd., Arlington, Va. 22209, phone (202) OXford 4–5588; or Prof. W.M. Fairbank, Stanford University, W. W. Hanson Laboratory of Physics, Stanford, Calif., phone (415) 327–7800.

Third International **Biophysics Congress**, Aug. 29–Sept. 3, at Cambridge, Mass. Sponsor: Air Force Office of Aerospace Research. Contact: Dr. R.V. Brown, Air Force Office of Scientific Research (SRLA), 1400 Wilson Blvd., Arlington, Va. 22209, phone (202) OXford 4–5042; or Prof. Walter Rosenblith, Dept. of Electrical Engineering, Massachusetts Institute of Technology, Cambridge, Mass.

Status of Funds Quarterly Report

Outlays

Second Quarter, Fiscal Year 1969

(Thousands of Dollars)

Department of Defense

	Outlays				Unpaid obligations	
	October 1968	November 1968	December 1968	Cum thru 31 Dec. 1968	At start of year	As of 31 Dec. 1968
Military Personnel						
Active forces	1,767,306	1,668,329	1,826,295	10,144,630	761,917	868,599
Reserve forces	75,132	61,903	63,381	495,925	149,746	121,970
Retired pay	197,931	198,893	201,133	1,175,933	6,880	6,747
Undistributed	−12,066	−14,035	−124,993	−148,964	—	148,964
Total—Military Personnel	2,028,302	1,915,090	1,965,816	11,667,524	918,543	1,146,280
Operation and Maintenance	1,696,547	1,863,881	2,036,454	10,703,720	4,033,198	4,298,515
Procurement						
Aircraft	784,237	782,060	775,916	4,697,075	9,591,226	8,450,402
Missiles	225,963	199,659	219,781	1,160,070	2,069,735	2,608,756
Ships	183,744	158,151	157,511	935,273	3,447,418	3,392,563
Tracked combat vehicles	46,495	42,717	42,797	218,606	610,190	533,948
Ordnance, vehicles and related equipment	514,536	535,510	541,010	2,702,685	6,595,367	8,388,703
Electronics and communications	133,244	122,637	111,856	697,846	1,881,334	1,649,372
Other procurement	189,198	175,338	82,120	899,109	2,056,183	2,035,476
Undistributed	3,164	−1,372	53,737	394,055	−7,225	−401,485
Total—Procurement	2,080,577	2,014,705	1,984,727	11,704,720	26,244,228	26,657,738
Research, Development, Test, & Evaluation						
Military sciences	77,712	79,545	71,245	467,374	777,774	744,419
Aircraft	88,030	107,851	99,849	476,246	717,451	693,759
Missiles	225,163	199,979	199,783	1,149,943	983,018	1,424,582
Astronautics	101,841	109,738	90,964	632,169	487,480	543,766
Ships	28,639	23,054	25,090	149,969	245,279	340,262
Ordnance, vehicles and related equipment	29,182	31,448	25,848	152,313	216,577	273,883
Other equipment	71,803	58,196	57,286	358,800	478,981	531,213
Program-wide management and support	38,377	26,894	49,098	292,925	189,338	214,648
Undistributed	−7,620	−4,236	9,678	−9,588	−1,633	7,243
Total—Research, Development, Test, & Evaluation	653,128	632,470	628,841	3,670,152	4,094,265	4,773,775
Military Construction	139,414	124,774	130,901	674,864	1,784,255	1,858,362
Family Housing	45,928	44,281	46,427	254,045	174,687	237,798
Civil Defense	7,040	7,334	8,382	44,525	80,629	65,497
Other—Special Foreign Currency Program	272	107	99	715	1,071	490
Revolving and Management Funds	94,272	−243,283	−89,942	−537,359	6,078,411	7,079,014
Subtotal—Military Functions—Federal Funds	6,745,481	6,359,358	6,711,704	38,182,904	43,409,287	46,117,466
Military Assistance—Federal Funds	56,461	42,830	8,143	248,968	1,823,034	1,611,206
Grand Total—Federal Funds	6,801,942	6,402,188	6,719,847	38,431,872	45,232,322	47,728,672
Total—Military Funcations-Bud. Concept adj.	−7,922	−23,571	−9,345	−68,369	8,794	2,636
Total—Military Assistance-Bud. Concept adj.	22,149	36,047	−31,099	142,756	433,454	224,812
Grand Total—Budget Concept adjustments	14,227	12,477	−40,445	74,387	442,248	227,449
TOTAL—DEPARTMENT OF DEFENSE	**6,816,169**	**6,414,664**	**6,679,403**	**38,506,259**	**45,674,570**	**47,956,121**

Department of the Army

Military Personnel						
Active forces	719,582	679,321	828,074	4,151,606	382,077	362,294
Reserve forces	49,893	40,348	42,743	340,525	112,578	81,745
Undistributed	30,105	−6,003	−148,995	−200,056	—	200,056
Total—Military Personnel	799,580	713,666	721,822	4,292,075	494,654	644,095
Operation and Maintenance	695,366	703,995	850,498	4,108,136	1,541,708	1,283,818
Procurement						
Aircraft	92,318	102,885	106,972	558,878	1,343,518	1,205,566
Missiles	52,328	44,992	48,139	259,036	629,712	1,023,969
Tracked combat vehicles	37,744	42,203	41,803	206,703	586,046	512,760
Ordnance, vehicles, and related equipment	193,574	256,191	283,247	1,243,865	3,445,481	4,493,275
Electronics and communications	53,808	46,808	41,525	221,808	688,774	613,233
Other procurement	49,204	41,448	43,483	242,542	769,510	655,339
Undistributed	12,681	−4,823	34,760	385,586	−7,225	−393,029
Total—Procurement	491,657	529,703	599,932	3,118,420	7,455,816	8,111,113
Research, Development, Test, & Evaluation						
Military sciences	10,397	7,746	8,968	55,042	98,272	109,856
Aircraft	8,128	6,399	6,777	49,257	78,199	92,254
Missiles	56,173	57,381	57,544	319,218	386,366	524,958
Astronautics	908	857	1,255	5,148	7,865	5,163
Ordnance, vehicles, and related equipment	14,977	14,659	12,062	78,180	110,532	125,918
Other equipment	29,960	31,984	26,758	164,858	196,748	198,437
Program-wide management and support	8,581	7,007	7,694	45,402	33,898	38,122
Undistributed	−2,095	−6,059	5,006	18,478	−1,633	−20,823
Total—Research, Development, Test, & Evaluation	127,030	119,974	126,064	735,583	910,247	1,073,885
Military Construction	45,363	43,485	32,440	212,783	768,046	789,846
Revolving and Management Funds	6,093	−68,285	−23,706	−18,892	1,955,905	1,869,930
Army—Federal Funds	2,165,089	2,042,538	2,307,049	12,448,104	13,126,377	13,772,688
Army—Budget Concept adjustments	−5,545	−18,973	−4,493	−36,036	10	−315
TOTAL—DEPARTMENT OF THE ARMY	**2,159,544**	**2,023,565**	**2,302,556**	**12,412,068**	**13,126,387**	**13,772,373**

Department of the Navy

	Outlays				Unpaid obligations	
	October 1968	November 1968	December 1968	Cum thru 31 Dec. 1968	At start of year	As of 31 Dec. 1968
Military Personnel						
Active forces	522,167	480,107	506,629	2,935,170	225,093	275,627
Reserve forces	12,281	10,271	10,091	75,435	22,898	26,019
Undistributed	−45,758	2,078	19,471	26,735	—	−26,735
Total—Military Personnel	488,690	492,456	536,191	3,037,340	247,991	274,911
Operation and Maintenance	321,465	505,469	529,925	2,743,209	1,466,352	1,689,374
Procurement						
Aircraft	235,593	227,884	242,051	1,413,672	3,218,049	2,890,425
Missiles	43,149	38,835	53,482	238,675	547,934	746,532
Ships	183,744	158,151	157,511	935,273	3,447,418	3,392,563
Tracked combat vehicles	8,751	514	994	11,903	24,144	21,188
Ordnance, vehicles, and related equipment	180,882	132,512	109,771	742,143	1,713,934	1,892,005
Electronics and communications	42,999	39,863	38,323	254,525	645,301	580,778
Other procurement	119,095	85,878	55,208	429,830	1,143,225	1,239,800
Undistributed	−9,942	−558	20,846	16,878	—	−16,878
Total—Procurement	804,270	683,082	678,185	4,042,900	10,740,005	10,746,415
Research, Development, Test, & Evaluation						
Military sciences	17,152	18,781	12,326	94,062	121,458	153,193
Aircraft	37,724	34,450	26,690	175,546	257,524	244,279
Missiles	57,944	53,665	53,027	349,391	258,025	435,128
Astronautics	1,416	1,703	1,562	9,514	16,259	20,219
Ships	28,639	23,054	25,090	149,969	245,279	340,262
Ordnance, vehicles, and related equipment	14,205	16,789	13,786	74,133	106,045	147,965
Other equipment	10,785	9,900	9,318	57,583	79,604	105,182
Program-wide management and support	8,978	−2,281	20,097	111,670	133,064	136,224
Undistributed	−2,983	1,121	6,737	7,388	—	−7,388
Total—Research, Development, Test, & Evaluation	173,860	157,182	168,633	1,029,256	1,217,258	1,575,064
Military Construction	46,633	26,796	52,053	210,178	573,575	675,741
Revolving and Management Funds	124,003	−104,420	−66,686	−165,656	2,269,078	2,329,353
Navy—Federal Funds	1,958,921	1,760,566	1,898,301	10,897,228	16,514,258	17,290,855
Navy—Budget Concept adjustments	895	−1,981	−3,345	−18,342	110	361
TOTAL—DEPARTMENT OF THE NAVY	**1,959,816**	**1,758,585**	**1,894,956**	**10,878,886**	**16,514,368**	**17,291,215**

Department of the Air Force

Military Personnel						
Active forces	525,557	508,901	491,592	3,057,854	154,747	230,678
Reserve forces	12,958	11,284	10,547	79,965	14,270	14,206
Undistributed	3,587	−10,110	4,531	24,357	—	−24,357
Total—Military Personnel	542,102	510,075	506,670	3,162,176	169,017	220,527
Operation and Maintenance	593,123	568,988	561,905	3,313,866	927,881	1,210,550
Procurement						
Aircraft	456,326	451,291	426,893	2,724,525	5,029,659	4,354,411
Missiles	130,486	115,832	118,160	662,359	892,089	838,255
Ordnance, vehicles, and related equipment	139,449	146,557	147,889	714,416	1,434,835	2,002,862
Electronics and communications	36,005	35,465	30,709	216,462	539,008	449,693
Other procurement	19,632	44,477	−20,136	210,584	100,001	100,042
Undistributed	297	3,794	−3,303	−10,264	—	10,277
Total—Procurement	782,193	797,419	700,209	4,518,080	7,995,592	7,755,539
Research, Development, Test, & Evaluation						
Military sciences	12,971	12,807	10,795	76,193	104,162	108,532
Aircraft	42,178	67,002	66,382	251,443	381,728	357,226
Missiles	111,046	88,933	89,212	481,334	338,627	464,496
Astronautics	99,517	107,178	88,147	617,507	463,356	518,384
Other equipment	31,058	16,312	21,210	136,359	202,629	227,594
Program-wide management and support	20,818	22,168	21,307	135,853	22,376	40,302
Undistributed	−2,542	702	−2,065	−35,454	—	35,454
Total—Research, Development, Test, & Evaluation	315,046	315,103	294,988	1,663,236	1,512,878	1,751,988
Military Construction	46,213	53,750	45,613	247,545	425,858	378,520
Revolving and Management Funds	−51,324	−65,372	−17,773	−229,534	521,170	1,713,367
Air Force—Federal Funds	2,227,353	2,179,962	2,091,612	12,675,368	11,552,396	13,030,489
Air Force—Budget Concept adjustments	−3,055	−2,607	−1,514	−13,983	8,675	2,340
TOTAL—DEPARTMENT OF THE AIR FORCE	**2,224,298**	**2,177,355**	**2,090,098**	**12,661,385**	**11,561,071**	**13,032,830**

Defense Agencies/Office of the Secretary of Defense

	Outlays				Unpaid obligations	
	October 1968	November 1968	December 1968	Cum thru 31 Dec. 1968	At start of year	As of 31 Dec. 1968
Military Personnel						
Retired Pay	197,931	198,893	201,133	1,175,933	6,880	6,747
Operation and Maintenance	86,593	85,429	94,126	538,509	97,258	114,773
Procurement						
Ordnance, vehicles, and related equipment	631	250	103	2,261	1,117	561
Electronics and communications	432	501	1,299	5,051	8,251	5,668
Other procurement	1,267	3,535	3,565	16,153	43,447	40,295
Undistributed	128	215	1,434	1,855	—	−1,855
Total—Procurement	2,457	4,502	6,401	25,320	52,815	44,669
Research, Development, Test, & Evaluation						
Military sciences	37,192	40,211	39,156	242,077	453,882	372,838
Military Construction	1,205	743	794	4,357	16,777	14,256
Family Housing	45,928	44,281	46,427	254,045	174,687	237,798
Other—Special Foreign Currency Program	272	107	99	715	1,071	490
Revolving and Management Funds	15,500	−5,207	18,223	−123,277	1,332,258	1,166,364
Defense Agencies—Federal Funds	387,078	368,958	406,360	2,117,679	2,135,628	1,957,937
Defense Agencies—Budget Concept adjustments	−217	−9	6	−8	—	251
TOTAL—DEFENSE AGENCIES	386,861	368,948	406,366	2,117,671	2,135,628	1,958,188

Office of Civil Defense

Civil Defense	7,040	7,334	8,382	44,525	80,629	65,497
Revolving and Management Funds	—	—	—	—	—	—
TOTAL—OFFICE OF CIVIL DEFENSE-FED. FUNDS	7,040	7,334	8,382	44,525	80,629	65,497

Military Assistance

Military Personnel	28	15	12	122	353	263
Operation and Maintenance	18,606	16,305	14,231	108,940	230,840	212,989
Procurement						
Aircraft	8,123	5,974	7,879	46,996	226,880	194,712
Missiles	1,271	388	444	2,288	16,035	13,542
Ships	2,678	322	−160	4,506	43,984	84,223
Ordnance, vehicles, and related equipment	10,146	14,620	3,788	56,438	192,738	171,349
Electronics and communications	4,330	3,011	1,769	29,998	101,235	92,244
Other procurement	3,786	1,269	1,292	18,499	88,420	88,041
Total—Procurement	30,334	25,584	15,012	158,725	669,292	644,111
Research, Development, Test, & Evaluation	10	−10	10	10	35	49
Military Construction	23	19	50	935	6,809	5,963
Revolving Fund	3,726	2,877	−19,584	5,694	848,233	745,935
Undistributed	3,736	−1,963	−1,588	−25,459	67,472	1,896
Subtotal—Military Assistance	56,461	42,830	8,143	248,968	1,823,034	1,611,206
Total—Military Assistance-Budget Concept adjustments	22,149	36,047	−31,099	142,756	433,454	224,812
TOTAL—MILITARY ASSISTANCE	78,610	78,877	−22,957	391,723	2,256,488	1,836,018

Obligations

Department of Defense	Available for Obligation	Obligations				Unobligated balance 31 Dec. 1968
		October 1968	November 1968	December 1968	Cum thru 31 Dec. 1968	
Military Personnel						
Active forces	19,576,230	1,768,187	1,680,555	1,694,548	10,428,496	9,147,734
Reserve forces	909,786	65,407	62,218	56,476	459,458	450,328
Retired pay	2,275,000	197,876	199,080	201,312	1,175,489	1,099,511
Total—Military Personnel	22,761,016	2,031,471	1,941,852	1,952,336	12,063,443	10,697,573
Operation and Maintenance	23,698,730	2,308,955	1,605,976	1,675,713	12,095,286	11,603,443
Procurement						
Aircraft	11,588,998	534,958	545,971	899,503	3,823,757	7,765,241
Missiles	4,190,429	238,553	213,778	230,201	1,763,691	2,426,738
Ships	3,635,059	146,733	94,734	143,098	920,139	2,714,920
Tracked combat vehicles	459,581	52,774	13,946	23,997	171,427	288,154
Ordnance, vehicles, and related equipment	10,203,648	1,002,203	774,060	384,019	5,512,854	4,690,794
Electronics and communications	2,357,000	108,693	95,503	94,842	556,874	1,800,126
Other procurement	3,355,778	191,121	185,444	102,915	1,072,311	2,283,467
Undistributed	−420,303	—	—	—	—	−420,303
Total—Procurement	35,370,189	2,275,038	1,923,433	1,878,577	13,821,053	21,549,135
Research, Development, Test, & Evaluation						
Military sciences	1,278,041	71,499	73,084	77,748	475,243	802,798
Aircraft	1,128,992	−9,280	98,978	57,886	454,155	674,837
Missiles	2,620,125	248,576	113,232	141,676	1,639,984	980,141
Astronautics	1,306,808	181,883	82,754	97,719	727,548	579,260
Ships	431,702	21,897	27,069	31,410	256,260	175,442
Ordnance, vehicles, and related equipment	399,151	20,036	16,354	25,487	210,508	188,643
Other equipment	1,024,325	70,070	48,899	53,167	418,547	605,778
Program-wide management and support	1,133,839	69,682	95,043	68,201	477,852	655,987
Emergency Fund	—	—	—	—	—	—
Undistributed	79,293	—	—	—	—	79,293
Total—Research, Development, Test, & Evaluation	9,402,278	674,363	555,413	553,298	4,660,100	4,742,178
Military Construction	3,528,773	173,972	161,496	133,712	952,766	2,576,007
Family Housing	757,467	60,655	41,190	52,288	321,639	435,828
Civil Defense	69,206	3,391	7,181	7,519	30,608	38,598
Other	15,742	−20	83	2	134	15,608
Subtotal—Military Functions	95,603,401	7,527,826	6,236,623	6,253,446	43,945,030	51,658,371
Military Assistance	682,001	12,499	1,088	17,999	135,616	546,385
TOTAL—DEPARTMENT OF DEFENSE	96,285,402	7,540,327	6,237,709	6,271,445	44,080,645	52,204,756

Department of the Army

	Available for Obligation	Obligations				Unobligated balance 31 Dec. 1968
		October 1968	November 1968	December 1968	Cum thru 31 Dec. 1968	
Military Personnel						
Active forces	8,094,634	719,484	675,538	686,658	4,263,079	3,831,555
Reserve forces	593,600	45,921	39,178	36,339	301,065	292,535
Total—Military Personnel	8,688,234	765,405	714,716	722,997	4,564,144	4,124,090
Operation and Maintenance	8,879,625	803,769	656,535	632,676	4,405,763	4,473,861
Procurement						
Aircraft	1,217,329	35,215	68,120	38,657	430,878	786,451
Missiles	1,118,573	62,900	103,486	68,855	694,738	423,835
Tracked combat vehicles	429,245	49,918	14,430	23,875	162,480	266,765
Ordnance, vehicles, and related equipment	5,789,273	518,346	491,096	232,586	3,303,161	2,486,112
Electronics and communications	944,654	31,074	27,499	27,772	200,921	743,733
Other procurement	846,137	38,047	36,594	14,014	163,413	682,724
Undistributed	−435,850	—	—	—	—	−435,850
Total—Procurement	9,909,361	735,500	741,225	405,759	4,955,591	4,953,770
Research, Development, Test, & Evaluation						
Military sciences	203,515	15,618	14,050	12,776	97,142	106,373
Aircraft	160,821	9,103	7,179	12,294	64,647	96,174
Missiles	785,399	35,770	27,749	42,568	459,926	325,473
Astronautics	12,138	609	319	345	2,459	9,679
Ordnance, vehicles, and related equipment	211,114	11,261	4,894	12,886	94,412	116,702
Other equipment	483,265	27,708	25,454	22,741	169,262	314,003
Program-wide management and support	100,701	5,770	7,023	5,413	50,948	49,753
Undistributed	−4,021	—	—	—	—	−4,021
Total—Research, Development, Test, & Evaluation	1,952,932	105,839	86,668	109,023	938,796	1,014,136
Military Construction	1,539,593	52,169	58,350	66,823	357,680	1,181,913
TOTAL—DEPARTMENT OF THE ARMY	30,969,745	2,462,682	2,257,494	1,937,278	15,221,974	15,747,771

Department of the Navy

Military Personnel						
Active forces	5,763,804	515,018	486,164	497,867	3,011,701	2,752,103
Reserve forces	156,256	9,294	10,827	11,296	78,155	78,101
Total—Military Personnel	5,920,060	524,312	496,991	509,163	3,089,856	2,830,204
Operation and Maintenance	6,491,067	889,144	532,924	341,999	3,322,681	3,168,386
Procurement						
Aircraft	3,514,333	296,795	165,593	387,672	1,113,251	2,401,082
Missiles	998,799	15,418	35,928	26,782	450,969	547,830
Ships	3,635,059	146,733	94,734	143,098	920,139	2,714,920
Tracked combat vehicles	30,336	2,856	−484	122	8,947	21,389
Ordnance, vehicles, and related equipment	2,231,725	297,506	238,421	80,865	925,545	1,306,180
Electronics and communications	791,153	57,932	28,567	43,422	195,404	595,749
Other procurement	1,929,356	139,009	102,704	72,203	680,709	1,248,647
Undistributed	−137,077	—	—	—	—	−137,077
Total—Procurement	12,993,682	956,250	665,463	754,166	4,294,966	8,698,720
Research, Development, Test, & Evaluation						
Military sciences	292,464	16,031	13,326	18,844	129,012	163,452
Aircraft	422,856	16,064	21,614	5,491	162,411	260,445
Missiles	769,548	41,049	26,296	42,373	537,737	231,811
Astronautics	25,053	3,806	6,904	−4,042	13,539	11,514
Ships	431,702	21,897	27,069	31,410	256,260	175,442
Ordnance, vehicles, and related equipment	188,037	8,775	11,460	12,601	116,096	71,941
Other equipment	137,386	15,871	6,337	7,866	84,401	52,985
Program-wide management and support	749,002	42,117	65,994	42,254	265,752	483,250
Undistributed	301	—	—	—	—	301
Total—Research, Development, Test, & Evaluation	3,016,349	165,610	179,000	156,797	1,565,208	1,451,141
Military Construction	1,309,757	90,006	54,530	44,133	391,407	918,350
TOTAL—DEPARTMENT OF THE NAVY	29,730,915	2,625,322	1,928,909	1,806,258	12,664,119	17,066,796

Department of the Air Force

	Available for Obligation	Obligations				Unobligated balance 31 Dec. 1968
		October 1968	November 1968	December 1968	Cum thru 31 Dec. 1968	
Military Personnel						
Active forces	5,717,792	533,685	518,853	510,023	3,153,716	2,564,076
Reserve forces	159,930	10,192	12,213	8,841	80,238	79,692
Total—Military Personnel	5,877,722	543,878	531,065	518,864	3,233,954	2,643,768
Operation and Maintenance	7,204,552	511,528	329,498	612,581	3,790,438	3,414,115
Procurement						
Aircraft	6,857,336	202,948	312,258	473,174	2,279,628	4,577,708
Missiles	2,073,057	160,235	74,364	134,564	617,984	1,455,073
Ships	—	—	—	—	—	—
Ordnance, vehicles, and related equipment	2,179,760	185,935	44,360	70,328	1,282,443	897,317
Electronics and communications	611,190	19,563	38,068	23,505	158,081	453,109
Other procurement	482,056	12,380	42,092	15,238	210,625	271,431
Undistributed	128,526	—	—	—	—	128,526
Total—Procurement	12,331,926	581,064	512,138	716,809	4,548,759	7,783,168
Research, Development, Test, & Evaluation						
Military sciences	194,800	13,437	12,680	10,829	86,843	107,957
Aircraft	545,315	−34,447	70,185	40,101	227,097	318,218
Missiles	1,065,178	171,757	59,187	56,735	642,321	422,857
Astronautics	1,269,617	177,468	75,531	101,416	711,550	558,067
Other equipment	403,674	26,491	17,108	22,560	164,884	238,790
Program-wide management and support	284,136	21,795	22,026	20,534	161,152	122,984
Undistributed	83,013	—	—	—	—	83,013
Total—Research, Development, Test, & Evaluation	3,845,735	376,500	256,718	252,178	1,993,849	1,851,886
Military Construction	573,167	31,806	48,960	22,330	201,842	371,325
TOTAL—DEPARTMENT OF THE AIR FORCE	29,833,102	2,044,775	1,678,380	2,122,762	13,768,842	16,064,259

Defense Agencies/Office of the Secretary of Defense

Military Personnel						
Retired Pay	2,275,000	197,876	199,080	201,312	1,175,489	1,099,511
Operation and Maintenance	1,123,486	104,515	87,018	88,458	576,405	547,081
Procurement						
Ordnance, vehicles, and related equipment	2,890	416	183	240	1,705	1,185
Electronics and communications	10,003	124	1,369	143	2,468	7,535
Other procurement	98,229	1,685	3,054	1,460	17,564	80,665
Undistributed	24,098	—	—	—	—	24,098
Total—Procurement	135,220	2,224	4,607	1,843	21,737	113,483
Research, Development, Test, & Evaluation						
Military sciences	587,262	26,413	33,028	35,299	162,246	425,016
Emergency Fund	—	—	—	—	—	—
Undistributed	—	—	—	—	—	—
Total—Research, Development, Test, & Evaluation	587,262	26,413	33,028	35,299	162,246	425,016
Military Construction	106,257	−9	−345	427	1,837	104,420
Family Housing	757,467	60,655	41,190	52,288	321,639	435,828
Other	15,742	−20	83	2	134	15,508
TOTAL—DEFENSE AGENCIES/OSD	5,000,433	391,656	364,660	379,629	2,259,487	2,740,947

Office of Civil Defense

Civil Defense	69,206	3,391	7,181	7,519	30,608	38,598

Military Assistance

Military Personnel	78	26	—	—	78	—
Operation and Maintenance	637,795	9,788	3,154	13,388	91,715	546,080
Procurement						
Aircraft	11,593	1,095	−545	992	11,482	111
Missiles	−9	−282	−1,253	−64	−9	—
Ships	1,801	112	44	−40	1,678	123
Ordnance, vehicles, and related equipment	16,839	2,654	−485	2,341	16,839	—
Electronics and communications	8,591	−504	1,809	563	8,575	16
Other procurement	5,174	−356	−1,065	355	5,159	15
Total—Procurement	43,989	2,719	−1,495	4,147	43,724	265
Research, Development, Test, & Evaluation	—	−27	27	−27	−27	27
Military Construction	138	—	−35	13	138	—
Undistributed	1	−5	−566	479	−13	14
TOTAL—MILITARY ASSISTANCE	682,001	12,499	1,088	17,999	135,616	546,385

NOTE: All outlay amounts are on a net Treasury basis (gross payments less reimbursement collections), whereas obligations and unpaid obligations are on a gross basis (inclusive of reimbursable activity performed by components of DOD for each other). Therefore, unpaid obligations as of the end of the reporting month cannot be computed from other figures in this report.

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A parawing self-rescue model shown in simulated flight after ejection from a disabled aircraft.

Navy-Air Force Investigate Pilot Rescue Systems

Two aircrew self-rescue concepts, which may enable a crewman of a disabled aircraft to use his ejection seat to fly away from enemy territory, have been developed for a joint Air Force-Navy program.

Reinhold J. Gross of the Recovery and Crew Station Branch, Air Force Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio, laboratory project engineer on the effort to determine capabilities of the systems, said models of both types have been built and are being evaluated.

The Air Force system is a "V" type parawing, built by the Stencel Aero Engineering Corp., Asheville, N.C. With the parawing system, a jet engine would be ignited following ejection from the aircraft, propelling the ejection seat and crewman at 85 to 90 miles per hour up to altitudes of 10,000 feet.

Maneuvering via the parawing's center of gravity and wing bank control system, the crewman would fly to friendly territory, where he would jettison the ejection seat and rescue assembly and parachute to the ground. The parawing version weighs 600 pounds.

Both the parawing and the Navy version, utilizing a rotor, would be packed into the back of the ejection seat.

Army Studies Aviation Needs Through 1975

How does aviation fit into the Army of 1975? And what type of aircraft and equipment will be needed?

The answers to these questions were supplied by the recent Aviation-75 Basic Derivative Study of the U.S. Army Combat Developments Command Aviation Agency, Fort Rucker, Ala.

Aviation-75 was an 18-month effort by the Aviation Agency to define operations, organizations and materiel required to support the combat arms in the next five years.

Developments foreseen for the five-year period include the greater use of heavy-lift helicopters for logistic support and a requirement for heavy-lift helicopters of even greater payload capacity. Also occurring during the period will be the introduction of the AH-56 Cheyenne attack helicopter to supplement the AH-1G Huey Cobra for support of airmobile operations.

For the study, aviation units were tailored to meet the needs of a particular threat and environment. To the basic component of the aviation battalion were added combinations of type-aviation companies to meet the needs of the supported company, such as assault helicopter companies, general support companies and medium helicopter companies. As needs arose, other specialized aircraft would be required.

According to the study, all aircraft are available now or would be available during the 1970–1975 period.

Army Seeks Aviation Fireproofing Aids

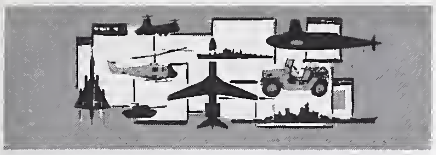
In an effort to reduce the number of casualties in aircraft accidents, the U.S. Army Aviation Agency, Combat Development Command (CDC), Fort Rucker, Ala., has called for the development of fireproof clothing for aircrewmen and crash-resistant fuel cells for aircraft.

Research has disclosed that post-crash fires caused approximately 65 percent of the fatalities in aircraft accidents. The development of the fireproof clothing and the crash-resistant fuel cell could greatly reduce the loss of personnel and equipment.

CDC envisions the cloth being used in a system of clothing, including uniforms, undergarments, socks and footwear. Requirements for the cloth specify that it should not prevent crewmen from performing normal duties even in severe temperature extremes. Reliability and maintainability of the cloth must be equal to that of current uniform materials. The ideal cloth would also be impervious to chemical and biological agents.

The crash-resistant fuel cell CDC is seeking would resist rupture and leakage as a result of an aircraft accident, and would be self-sealing when hit by a fully tumbling 14.5mm round. The cell would be designed to fit all aircraft currently in use without modification to the airframes. In addition, it would impose no limitations for use in future aircraft.

The material used in the fuel cell would be unaffected by temperature, humidity and altitude, and would be resistant to external electrical and chemical fires.



DEFENSE PROCUREMENT

Contracts of $1,000,000 and over awarded during the month of March 1969:

DEFENSE SUPPLY AGENCY

3—**DeRossi & Son Co.,** Vineland, N.J. $2,763,700. 145,000 men's tropical wool polyester coats. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1591.

—**Superior Coat Co.,** Paulsboro, N.J. $1,074,000. 60,000 men's tropical wool polyester coats. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1592.

—**Marcie Dale, Inc.,** Atlantic City, N.J. $2,234,400. 120,000 men's tropical wool polyester coats. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1593.

—**Landis Clothes, Inc.,** Vineland, N.J. $1,179,000. 60,000 men's tropical wool polyester coats. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1594.

—**South Jersey Clothing Co.,** Minotola, N.J. $2,552,500. 125,000 men's tropical wool polyester coats. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1595.

—**Newell Clothing Co.,** Vineland, N.J. $1,348,400. 70,000 men's tropical wool polyester coats. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1596.

—**Edgington Oil Refineries,** Long Beach, Calif. $1,912,470. 1,260,000 barrels of number six fuel oil. Defense Fuel Supply Center, Alexandria, Va. DSA 600–69–D–1355.

4—**Putnam Mills,** New York, N.Y. $3,034,967. 2,940,000 yards of camouflage printed, wind-resistant, poplin (ripstop) cotton cloth. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1538.

—**Howard Knit Products,** Gastonia, N.C. $1,040,314. 1,493,400 men's crew neck undershirts. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1600.

5—**Burlington Industries,** New York, N.Y. $1,075,140. 362,000 yards of tropical wool cloth. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1627

—**J. P. Stevens & Co.,** New York, N.Y. $1,260,000. 400,000 yards of tropical wool cloth. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1628.

—**Dowling Bag Co.,** Valdosta, Ga. $1,214,250. 1,600,000 polypropylene sand bags and 3,750,000 acrylic sand bags. Defense General Supply Center, Richmond, Va. DSA 400–69–C–4683.

—**Crowley Industrial Bag Co.,** Crowley, La. $1,636,425. 6,175,000 acrylic fiber sand bags. Defense General Supply Center, Richmond, Va. DSA 400–69–C–4684.

—**Consolidated Bag Corp.,** Philadelphia, Pa. $2,728,560. 10,200,000 acrylic fiber sand bags. Defense General Supply Center, Richmond, Va. DSA 400–69–C–4685.

—**Cavalier Bag Co.,** Lumberton, N.C. $3,545,430. 13,000,000 acrylic sand bags. Defense General Supply Center, Richmond, Va. DSA 400–69–C–4686.

6—**A. M. Ellis Hosiery Co.,** Philadelphia, Pa. $1,162,846. 2,000,000 pairs of men's socks. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1636.

7—**Burlington Industries,** New York, N.Y. $1,008,000. 300,000 yards of serge polyester wool cloth. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1587.

—**Lester D. Lawson & Co.,** Long Beach, Calif. $1,197,100. 40,320 cases of ration supplement sundries. Defense Personnel Support Center, Philadelphia, Pa. DSA 134–69–C–0772.

—**Van Brodie Milling Co.,** Clinton, Mass. $1,172,908. 40,320 cases of ration supplement sundries. Defense Personnel Support Center, Philadelphia, Pa. DSA 134–69–C–0723.

12—**A. G. Schoonmaker Co., Inc.,** Sausalito, Calif. $1,710,350. 1,013 portable self-contained floodlight sets. Defense General Supply Center, Richmond, Va. DSA 400–69–C–0217.

—**Mobil Oil Corp.,** New York, N.Y. $4,226,325. 53,656 barrels diesel fuels and 2,275,000 barrels No. 6 fuel oil. Defense Fuel Supply Center, Alexandria, Va. DSA 100–69–B–0014.

13—**Centre Manufacturing Co., Inc.,** Centre, Ala. $1,170,946. 121,720 men's coated nylon twill raincoats. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1734.

17—**Standard Oil Co. of Calif.** $2,811,800. 1,037,766 gallons gasoline, 18,499,075 gallons diesel fuel and 2,750 gallons kerosene. Defense Fuel Supply Center, Alexandria, Va. DSA–600–69–C–0982.

18—**Texaco, Inc.,** New York, N.Y. $1,745,000. 1,000,000 barrels number six fuel oil. Defense Fuel Supply Center, Alexandria, Va. DSA 600–69–D–1397.

—**Nantex-Riviera Corp.,** New York, N.Y. $1,454,680. 3,334,128 pairs men's white thigh length cotton drawers. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1765.

19—**Marmac Industries, Inc.,** Marysville, Mich. $1,134,611. 704,100 helmet liners. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1774.

20—**Stauffer Chemical Co.,** New York, N.Y. $1,075,958. 849,540 one-quart cans and 56,980 gallons of aircraft engine lubricating oil (synthetic). Defense Fuel Supply Center, Alexandria, Va. DSA 600–69–C–1721.

—**Shell Oil Co.,** New York, N.Y. $1,219,771. 1,055,460 one-quart cans and 5,500 gallon of aircraft engine lubricating oil (synthetic). Defense Fuel Supply Center, Alexandria, Va. DSA 600–69–C–1722.

—**Bates Fabrics, Inc.,** New York, N.Y. $3,597,462. 3,807,000 linear yards of wind resistant cotton poplin cloth. camouflage printed. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1775.

—**McRae Shoe Co.,** Mount Gilead, N.C. $1,132,997. 133,334 pairs of men's leather combat boots. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1571.

—**J.P. Stevens and Co., Inc.,** New York, N.Y. $2,646,000. 1,200,000 yards polyester (fiber and wool) tropical cloth. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1676.

—**Burlington Industries, Inc.,** New York, N.Y. $2,507,000. 1,150,000 yards polyester (fiber and wool) tropical cloth. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1675.

21—**American Oil Co.,** Chicago, Ill. $1,063,795. 83,000 barrels number five and six fuel oil and 197,430 barrels diesel fuel. Defense Fuel Supply Center, Alexandria, Va. DSA 600–69–D–0382.

24—**West Point Pepperell, Inc.,** New York, N.Y. $1,752,079. 1,537,288 cotton bed sheets. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1790.

26—**Tanenbaum Textile Co.,** Inc., New York, N.Y. $1,268,370. 650,000 linear yards of ballistic nylon cloth. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1816.

—**Putnam Mills Corp.,** New York, N.Y. $1,711,372. 900,000 linear yards of ballistic nylon cloth. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1817.

—**Emerson Clothing, Inc.,** Pleasantville, N.J. $1,095,513. 40,070 men's blue serge wool overcoats. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1795.

—**Pembroke, Inc.,** Egg Harbor City, N.J. $3,414,432. 100,000 men's wool gabardine overcoats with removable liners. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1829.

—**Major Coat Co., Inc.,** Bridgeton, N.J. $2,282,350. 65,000 men's wool gabardine overcoats with removable liners. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1830.

27—**Humble Oil & Refining Co.,** Houston, Texas. $1,290,883. 146,000 barrels of number five fuel oil, 52,600 barrels of number six fuel oil, 231.000 barrels of Navy special fuel oil and 45,340 barrels of diesel fuel. Defense Fuel Supply Center, Alexandria, Va. DSA 600–69–D–1391.

—**Standard Oil Co. of Calif.,** San Francisco, Calif. $1,110,648. 49,000 barrels of number five fuel oil, 15,715 barrels number six fuel oil and 201,625 barrels diesel fuel. Defense Fuel Supply Center, Alexandria, Va. DSA 600–69–D–1394.

—**Valley Metallurgical Processing, Inc.,** Essex, Conn. $2,596,860. 8,300,000 pounds aluminum powder. Defense General Supply Center, Richmond, Va. DSA 400–69–C–4304.

—**U.S. Bronze Powders, Inc.,** Flemington, N.J. $2,718,000. 8,800,000 pounds aluminum powder. Defense General Supply Center, Richmond, Va. DSA 400–69–C–4309.

CONTRACT LEGEND

Contract information is listed in the following sequence: Date—Company — Value — Material or Work to be Performed—Location of Work Performed (if other than company plant) — Contracting Agency—Contract Number.

DEPARTMENT OF THE ARMY

3—**Avco Corp.,** Stratford, Conn. $1,374,759 (contract modification). T55–L–11 turbine engines for CH–47C helicopters. DA AJ01–68–C–1853; $1,531,500. CY 1969 product improvement program for T53 turbine engines. DA AJ01–69–C–0435; $2,308,500. CY 1969 product improvement program for T55 turbine engines. DA AJ01–69–C–0436. All three contracts were awarded by the Aviation Systems Command, St. Louis, Mo.

—**L. E. Mason Co.,** Hyde Park, Mass. $1,395,632. Metal parts for nose body assemblies for bombs. Edgewood Arsenal, Md. DA AA15–69–C–0169.

—**White Motors,** Lansing, Mich. $3,517,540 (contract modification). 2½-ton trucks (M602). General Purpose Vehicles Project Manager, Warren, Mich. DA AE06–69–C–0003.

4—**Rulon Co.**, Chicago, Ill. $7,430,500. Metal parts for point detonating fuzes for 105mm and 155mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0266.

—**Bocing Co.**, Morton, Pa. $2,006114. Inspection and repair, as necessary, of nine CH47A helicopters and one CH47B helicopter, Aviation Systems Command, St. Louis, Mo. DA AJ01–69–C–2133.

5—**General Motors**, Cleveland, Ohio. $1,953,851 (contract modification). Gun/turret drive improvement program for the Main Battle Tank. Cleveland, Ohio and Milwaukee, Wis. Tank Automotive Command, Warren, Mich. DA 20–113–AMC–00843 (T).

—**Chrysler Motors**, Warren, Mich. $1,908,197 (contract modification). One-ton cargo trucks. Tank Automotive Command, Warren, Mich. DA AE07–69–C–0771.

—**Bell Aerospace Corp.**, Amarillio, Tex. $1,877,054. Repair of seven UH–1B and fifty-one UH1C aircraft. Aviation Systems Command, St. Louis, Mo. DA AJ01–68–C–0056.

—**Western Electric**, New York. N.Y. $1,688,500 (contract modification). Systems analysis studies in connection with the Sentinel Missile System. Whippany, N.J. Sentinel Systems Command, Huntsville, Ala. DA 30–069–AMC–00333 (Y).

—**Philco-Ford Corp.**, Willow Grove, Pa. $1,669,443 (contract modification). One year operation and maintenance at the Nha Trang Autodin site in Vietnam. Electronics Command, Fort Monmouth, N.J. DA 36–039–AMC–05589 (E).

6—**Olin Mathieson Chemical Corp.**, East Alton, Ill. $4,192,240 (contract modification). Loading assemblies of 81mm projectiles. Marion, Ill. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0086.

—**Chamberlain Mfg. Corp.**, Scranton, Pa. $1,843,824. Metal parts for 155mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0287.

—**General Motors**, Detroit, Mich. $1,059,526 (contract modification). Advance production engineering of the total package procurement of 1¼-ton ambulances. Warren, Mich. Tank Automotive Command, Warren, Mich. DA AE07–69–C–0071.

—**FMC Corp.**, San Jose, Calif. $31,255,814. M113 vehicles. Tank Automotive Command, Warren, Mich. DA AE07–69–C–2600.

7—**Maremont Corp.**, Saco, Maine, $3,072,800 (contract modification). 7.62mm machine guns. Army Weapons Command, Rock Island, Ill. DA AF03–69–C–0050.

—**Skyline Industries**, Fort Worth, Tex. $2,127,070 (contract modification). Demolition kits. Fort Worth, Tex. and McArthur, Ohio. Army Procurement Agency, Cincinnati, Ohio. DA AG31–69–C–0440.

—**J.D. Dutton, Inc.**, Olympia, Wash $1,099,000 Clearance of about 9000 timbered acres of reservoir land in Rogers and Nowata Counties, Okla. Engineer Dist., Tulsa, Okla. DA CW56–69–C–0076.

10—**Kaiser Jeep Corp.**, Toledo, Ohio. $29,746,076. XM809 five-ton trucks. South Bend, Ind. General Purpose Vehicle Project Manager, Warren, Mich. DA AE06–69–C–0009.

11—**Chamberlain Mfg. Corp.**, Waterloo, Iowa. $1,663,659. Metal parts for 105mm smoke projectiles, M84E1. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0383.

—**Forsberg & Gregory**, Redlands, Calif. $1,937,700. Construction of four 200-man three-story, reinforced concrete dormitories. Nellis AFB, Nev. Engineer Dist., Los Angeles, Calif. DA CA09–69–C–0140.

13—**Bell Helicopter Co.**, Fort Worth, Tex. $1,928,942. 172 rescue hoists for UH–1 helicopters. Hurst, Tex. Aviation Materiel Command, St. Louis, Mo. DA–AJ01–69–A0314.

—**Thiokol Chemical Corp.**, Woodbine, Ga. $1,757,538. CS2-filled munitions. Edgewood, Md, Arsenal. DA–AA15–69–C0517.

—**Olin Mathieson**, East Alton, Ill. $1,606,640. Loading, assembling and packing M84A1 fuzes for 81mm illuminating projectiles. Marion, Ill. Ammunition Procurement and Supply Agency, Joliet, Ill. DA–AA–09–69–C0387.

14—**Honeywell, Inc.**, North Hopkins, Minn. $3,061,300 (contract modification). Loaded grenade fuzes (M219E1). New Brighton, Minn. DA–AA09–69–C–0138. ; $1,986,600 (contract modification). Loaded grenade fuzes (M219E1). St. Louis Park, Minn. DA–AA09–69–C–0140. Both contracts awarded by Ammunition Procurement and Supply Agency, Joliet, Ill.

—**Wilkinson Manufacturing Co.**, Fort Calhoun, Neb. $1,315,957. Metal fuze parts (PDM524A5) for 81mm high explosive shells. Chicago Procurement Agency. DA–AA09–69–C–0245.

—**Smith and Wesson Div., Bango Punta Co.**, Springfield, Mass. $1,300,255. .38-caliber, 4-inch barrel revolvers. Army Weapons Command, Rock Island, Ill. DA–AF03–69–C–0067.

—**J.P. Cullen and Sons Corp.**, Janesville, Wis. $1,360,800. Restoration of hardening house. Badger Army Ammunition Plant, Baraboo, Wis. Chicago Engineer District, DA–CA23–69–C–0065.

17—**Uniroyal, Inc.**, Detroit, Mich. $2,450,386. Pneumatic truck and bus tires. Detroit, Mich., Los Angeles, Calif. and Chicopee Falls, Mass. Tank Automotive Command, Warren, Mich. DA–AE07–69–C–2788.

18—**Hughes Tool Co.**, Culver City, Calif. $2,357,334. Main rotor blades for OH–6A helicopters. Aviation Systems Command, St. Louis, Mo. DA–23–204–AMC–03687.

—**Varo, Inc.**, Garland, Tex. $1,057,402. AN/PVS–2 starlight scopes. Electronics Command, Fort Monmouth, N.J. DA–AB07–69–C–0258.

19—**Whittaker Corp.**, Columbus, Ohio. $3,473,580. Metal parts for 81mm mortar fuzes. Columbus and Westerville, Ohio. Ammunition Procurement and Supply Agency, Joliet, Ill. DA–AA09–69–C–0275.

—**Remington Arms Co., Inc.**, Bridgeport, Conn. $2,764,385. 5.56mm ball cartridges. Frankford Arsenal, Philadelphia, Pa DA–AA25–69–C0085.

20—**Harnischfeger Corp.**, Milwaukee, Wis. $5,865,398. Truck mounted cranes. Escanaba, Mich. Mobility Equipment Command, St. Louis, Mo. DA–AK01–69–C–7411.

—**Beckman Construction Co.**, Fort Worth, Texas. $2,044,083. Construction of aircraft engine shop. Tinker AFB, Okla. Engineer District, Fort Worth, Texas. DA–CA63–69–C–0125.

—**A.D. Roe Co., Inc.**, Louisville, Ky. $1,565,145. Construction of automotive instruction facility. Fort Knox, Ky. Engineer District, Louisville, Ky. DA–CA27–69–C0027.

—**Remington Arms Co., Inc.**, Bridgeport, Conn. $18,407,675. Load, assemble and pack small caliber ammunition. Lake City Ammunition Plant, Independence, Mo. Ammunition Procurement and Supply Agency, Joliet, Ill. DA–49–010–AMC–00003(A).

—**Silas Mason Co., Inc.**, New York, N.Y. $6,494,132. Load, assemble and pack ammunition. Iowa Army Ammunition Plant, Burlington, Iowa. Ammunition Procurement and Supply Agency, Joliet, Ill. DA–AA09–68–C–0468.

—**Federal Cartridge Corp.**, Minneapolis, Minn. $5,274,260. Load, assemble and pack 7.62mm and 5.56mm ball and tracer ammunition. Twin Cities Army Ammunition Plant, New Brighton, Minn. Ammunition Procurement and Supply Agency, Joliet, Ill. DA–36–038–AMC–01099(A).

—**National Gypsum Co.**, Buffalo, N.Y. $2,351,885. Load, assemble and pack ammunition. Kansas Army Ammunition Plant, Parsons, Kansas. Ammunition Procurement and Supply Agency, Joliet, Ill. DA–11–173–AMC–00095 (A).

—**Olin Mathieson Chemical Corp.**, New York, N.Y. $1,372,375. Production of propellants and related items. Badger Army Ammunition Plant, Baraboo, Wis. Ammunition Procurement and Supply Agency, Joliet, Ill. DA–AA09–69–C0014.

—**Hercules, Inc.**, Wilmington, Del. $1,167,077. Manufacture of various propellants. Sunflower Army Ammunition Plant, Lawrence, Kansas. Ammunition Procurement and Supply Agency, Joliet, Ill. DA–11–173–AMC–00042(A).

21—**Continental Motors Corp.**, Mobile, Ala. $4,537,840. Remanufacture of model LDS–465–1A multi-fuel engine assemblies for 5-ton trucks. Tank Automotive Command, Warren, Mich. DA–AE07–69–C–2606.

—**Pace Corp.**, Memphis, Tenn. $1,593,141. M127A1 illumination signals. Memphis, Tenn., and Camden, Ark. Picatinny Arsenal, Dover, N.J. DA–AA21–69–C–0519.

—**Xerox Corp.**, Pasadena, Calif. $1.184,050. AN/TVS–2 night vision sights. Pomona, Calif. Electronics Command, Fort Monmouth, N.J. DA–AB07–69–C0264.

24—**Hughes Aircraft Co.**, Culver City, Calif. $3,880,941. Forward looking infrared systems for aircraft. Mobility Equipment R&D Center, Fort Belvoir, Va. DA–AK02–69–C–0433.

25—**Union Carbide Corp.**, New York, N.Y. $2,024,850. BA–386/PRC–25 dry batteries for radio sets. Electronics Command, Philadelphia, Pa. DA–AB05–69–C–3466.

—**Motorola, Inc.**, Scottsdale, Ariz. $1,912,136. Fabrication of pilot line facilities for XM596 fuzes for 40mm grenade launchers. Harry Diamond Laboratories, Washington, D.C. DA–AG39–69–C0041.

—**General Motors Corp.**, Anderson, Ind. $1,313,530. Storage batteries for general vehicles. Anaheim, Calif. Tank Automotive Command, Warren, Mich. DA–AE07–69–C–3263.

26—**Texas Instruments, Inc.**, Dallas, Texas. $4,500,000 (contract modification). Classified electronic equipment. Electronics Command, Fort Monmouth, N.J.

—**Stromberg-Carlson Corp.**, Rochester, N.Y. $2,384,000 (contract modification). Integration/maintenance management and technical operation services for the Southeast Asia automatic telephone system. Electronic Command, Fort Monmouth, N.J. DA AB–07 67 C0580.

—**Western Electric Co.**, New York, N.Y. $1,656,900. Improved Nike Hercules kits. Burlington, N.C. Missile Command. Redstone Arsenal, Huntsville, Ala. DA AH–01 68 A0041.

27—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $10,268,556. OV–1D Mohawk aircraft related test data and reports. Stuart, Fla., and Bethpage, N.Y. Aviation Systems Command, St. Louis, Mo. DA–AJ01–69–C–0002.

—**Litton Systems, Inc.**, Woodland Hills, Calif. $5,891,000 (contract modification). AN/ASN–86 inertial navigational systems for OV–1D Mohawk. Electronics Command, Fort Monmouth, N.J. DA–AB07–68–C–0345.

—**Chamberlain Manufacturing Corp.**, Elmhurst. Ill. $4,330.712. Metal parts for 81mm projectiles. Burlington, N.J. Ammunition Procurement and Supply Agency, Joliet, Ill. DA–AA09–69–C–0161.

—**Mine Safety Appliances**, Pittsburgh, Pa. $2,829,480. Riot control agent masks. Ellport, Pa, and Export, Pa. The Edgewood Arsenal, Md. DA–AA15–68–C–0486.

—**Bell Aerospace Corp.**, Fort Worth, Texas. $1,193,753. UH–1 series helicopter spur gears. Hurst, Texas. Aviation Systems Command, St. Louis, Mo. DA–AJ01–69–A0314.

28—**Sperry Rand Corp.**, New York, N.Y. $20,079,830 (contract modification). Load, assemble and pack ammunition, and for support services. Shreveport, La. Ammunition Procurement and Supply Agency, Joliet, Ill. DA–11–173–AMC–00080(A).

—**Bulova Watch Co**, Providence, R.I. $2,576.000. Head assemblies for 60mm projectile fuzes. Ammunition Procurement and Supply Agency, Joliet, Ill. DA–AA09–69–C–0721.

—**Chamberlain Manufacturing Corp.**, Elmhurst, Ill. $1,509.470 (contract modification). Repairs and facilities in support of 8-inch and 175mm projectile metal parts. Scranton, Pa. Ammunition Procurement and Supply Agency, Joliet, Ill. DA–36–034–AMC–0163(A).

—**Union Carbide Corp.**, New York, N.Y. $3,024,420. Dry batteries and high temperature testing. Greenville, N.C., and Cleveland. Ohio. Electronics Command, Philadelphia, Pa. DA–AB05–69–C–3468.

—**General Motors Corp.**, Cleveland, Ohio. $2,346,852. Spare parts for M551 tank. Procurement Agency, Cincinnati, Ohio. DA–AG31–69–C–0388.

—**Gould National Battery, Inc.**, St. Paul, Minn. $2,178,460. Dry batteries and high temperature testing. Electronics Command, Philadelphia, Pa. DA–AB05–69–C–3469.

—**Cannon Construction Corp.**, Beverly Hills, Calif. $2,169,000. Construction of family housing units. Presidio, San Francisco, Calif. Engineer District, Sacramento, Calif. DA–CA05–69–C–0087.

—**Continental Motors Corp.**, Muskegon, Mich. $2,009,206 (contract modification). Spare diesel engines for M60 and M48 tanks. Tanks Automotive Command, Warren, Mich. DA–AE07–68–C–2734.

—**Olin Mathieson Chemical Corp.**, East Alton, Ill. $1,172,038. Fuel assembly blocks for AN/M7 smoke pots. Marion, Ill.

Edgewood Arsenal, Md. DA–AA15–69–C–0554.

—**General Motors Corp.**, Cleveland, Ohio. $1,160,000 and $1,404,000 (contract modifications). 155mm self propelled howitzers. Weapons Command, Rock Island Arsenal, Ill. DA–11–199–AMC–00610(W).

DEPARTMENT OF THE NAVY

3—**General Dynamics**, Pomona, Calif. $6,095,000 (contract modification). Increase in the limitation of authorization for Standard Arm missiles. Naval Air Systems Command. N00019–68–C–0074.

—**Honeywell, Inc.**, West Covina, Calif. $2,080,850. Training device 14A2D. Navy Training Device Center, Orlando, Fla. N61339–69–C–0036.

—**E. W. Bliss Co.**, Portland, Maine, $1,420,409. Short Airfield for Tactical Support (SATS) arresting gear systems (M21) with support equipment. Naval Air Engineering Center, Philadelphia, Pa. N00156–69–C–1378.

—**Gene Fuller Construction**, San Diego, Calif. $1,214,137. Construction of Aircraft Direct Fueling Stations at the Naval Air Station, Miramar, San Diego, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif. N62473–67–C–3012.

4—**Peterson Builders**, Sturgeon Bay, Wis. $5,083,500. Construction of six large Navy harbor tugs (YTB). Naval Ship Systems Command. N00024–69–C–0280.

—**Western Electric**, New York, N.Y. $1,850,000 (contract modification). Manufacture of an electronic signal processing equipment set. Burlington, N.C. Naval Electronic Systems Command. N00039–68–C–3601.

—**Texas Instruments**, Dallas, Tex. $1,721,150. Magnetic detecting sets. Naval Air Systems Command. N00019–69–C–0412.

—**Singer-General Precision, Inc.**, Glendale, Calif. $1,476,000. Development of torpedo (MK 48) fire control. Naval Ordnance Systems Command. N00017–69–C–1212.

5—**Sperry Rand Corp.**, Great Neck, N.Y. $2,822,500. Modifications for Terrier MK 76, MODS 3 & 5, Fire control System Modernization (production). Naval Ordnance Systems Command. N00017–67–C–0045.

—**Maxson Electronics Corp.**, Macon, Ga. $1,838,240. MK 31, MOD 2, base detonating fuzes for 5" 54 caliber projectiles. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–69–C–0299.

—**Westinghouse Electric**, Baltimore, Md. $1,150,000. Components of APD-7 side looking radar systems for installation in RA-5C aircraft. Aviation Supply Office, Philadelphia, Pa. N00383–69–A–4900–0121.

6—**General Electric**, West Lynn, Mass. $5,300,000. Development of TF34–GE–2 ground and flight test engines for the VSX flight test program. Naval Air Systems Command. N00019–69–C–0424.

—**Interstate Electronics**, Anaheim, Calif. $3,840,000. Poseidon missile test instrumentation. Strategic Systems Project Office. N00030–69–C–0209.

—**Jefferson Construction Co.**, Cambridge, Mass. $1,100,375. Construction of BOQ at the Naval Station, Newport, R.I. Northeast Div. Naval Facilities Engineering Command, Boston, Mass. N62464–69–C–0031.

10—**Vitro Corp.**, Silver Spring, Md., $9,784,420. Engineering services and support for surface missile systems. Naval Ordnance Systems Command. N00017–69–C–4415.

—**Trepte Construction Co.**, San Diego, Calif. $5,079,700. Construction of barracks and a mess hall. Camp Pendleton, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif. N62473–68–C–0179.

—**United Aircraft**, Hartford, Conn. $4,500,000. Conversion kits for converting TF–30–P–8 engines to TF–30–P–400 configuration. Aviation Supply Office, Philadelphia, Pa. N00383–9–6900A–AG242.

—**Sperry Rand Corp.**, St. Paul, Minn. $2,510,000. Furnishing tactical data system design and programming services, and for technical documentation and reports. Naval Ship Systems Command. N00024–69–C–1248.

—**Sparton Corp.**, Jackson, Mich. $1,229,937. AN/SSQ–53 sonobuoys. Naval Air Systems Command. N00019–69–C–0465.

12—**Westinghouse Electric Corp.**, Baltimore, Md. $2,717,491 (contract modification). AN/APG–59, 60 and 61 radar sets and associated equipment. Naval Air Systems Command. NOw 66–0138.

—**General Dynamics Corp.**, Pomona, Calif. $2,076,428. Work on Terrier/Tartar missiles. Naval Ordnance Systems Command. N00017–68–C–2108.

—**General Electric Co.**, Utica, N.Y. $1,801,098 (contract modification). Guidance and control groups for Chaparral missiles. Naval Air Systems Command N00019–68–C–0322.

—**Lockheed Aircraft Corp.**, Watchung, N.J. $1,817,659. Antiaircraft modification kits for gun fire control systems (MK 86 Mod 0). Naval Ordnance Systems Command. N00017–67–C–2308.

13—**Hughes Aircraft Co.**, Fullerton, Calif. $1,145,886. AN/SPS–32 radar modification kits. Naval Ships Systems Command. N000024–69–C–1201.

14—**United Aircraft Corporation**, Hartford, Conn. $7,431,957 (contract modification). J52–P–8A engines. N00019–67–C–0182.; $4,776,063. Design and development of TF–30–P–400 engine. N00019–69–C–0366. Both contracts by Naval Air Systems Command.

17—**LTV Aerospace Corp.**, Dallas, Tex. $1,667,874 (contract modification). Improvement changes on RF–8A aircraft. Naval Air Systems Command. N00019–68–C–0130.

18—**Raytheon Co.**, Portsmouth, R.I. $3,592,293. Submarine sonar equipment. Naval Ship Systems Command. N00024–69–C–1261.

—**Magnavox Co.**, Fort Wayne, Ind. $2,175,000. Classified work. Naval Electronics Systems Command. N00039–69–C–1560.

—**Raytheon Co.**, Lexington, Mass. $1,255,000. Research and development on AN/SPG–51 radar and fire control systems for Tartar missile. Wayland, Mass. Naval Ordnance Systems Command. N00017–69–C–2318.

19—**Peterson Builders, Inc.**, Sturgeon Bay, Wis. $2,166,660. Construction of five motor patrol gunboats (PGM). Naval Ship Systems Command. N00024–69–C–0288.

—**Sperry Rand Corp.**, St. Paul, Minn. $1,279,510. Computer components, spare parts and engineering services. Naval Ship Systems Command. N00024–69–C–1211.

—**Aerojet General Corp.**, Sacramento, Calif. $1,179,000. Sparrow missile rocket motors. Naval Air Systems Command. N00019–69–C–0222.

—**Dayton T. Brown, Inc.**, Bohemia, Long Island, N.Y. $1,163,600 (contract modification). Preproduction and production lot sample testing of bomb racks. Naval Air Systems Command. N00019–68–C–0324.

20—**United Aircraft Corp.**, East Hartford, Conn. $6,500,000. Design, development and testing of TF30–P–401 engine for F14A. Naval Air Systems Command. N00019–69–C–0393.

—**Boeing Co.**, Morton, Pa. $32,009,703 (contract modification). Structural modification to CH–46 helicopter landing gear and tail sections. Naval Air Systems Command. N00019–67–C–0255.

—**Akwa-Downey Construction Co.**, Milwaukee, Wis. $1,630,922. Construction of recruit barracks. Naval Training Center, Orlando, Fla. Naval Facilities Engineering Command, through the Southeast Division, San Diego, Calif. N62473–67–C–0575.

—**DeWeese Construction Co.**, Covina, Calif. $1,398,488. Construction of first increment of recruit school at Naval Training Center, San Diego, Calif. Naval Facilities Engineering Command through Southeast Div., San Diego, Calif. N62473–68–C–0105.

21—**General Electric Co.**, Schenectady, N.Y. $17,673,000. Design and furnishing of nuclear propulsion components. Naval Ship Systems Command. N00024–67–C–5056.

—**Marine Terminals Corp.**, Long Beach, Calif. $2,803,386. Stevadoring service. Naval Construction Battalion Center, Port Hueneme, Calif. Naval Purchasing Office, Los Angeles, Calif. N00123–69–D–0228.

24—**LTV Aerospace Corp.**, Dallas, Texas. $28,161,681 (contract modification). Incorporation of improvement changes on F–8B and F–8C aircraft. Naval Air Systems Command. N00019–68–C–0191.

—**Raytheon Co.**, Lexington, Mass. $2,713,918 (contract modification). Sparrow III missile guidance and control groups. Lowell, Mass., Bristol, Tenn., Bedford Mass. and Oxnard, Calif. Naval Air Systems Command. N00019–68–C–0225.

—**La Pointe Industries, Inc.**, Rockville, Conn. $1,176,500. AN/URC–32 radio sets and MK447/URC–32 kits. Naval Electronic Systems Command. N00039–69–C–0546.

—**Jacksonville Shipyards, Inc.**, Jacksonville, Fla. $1,166,131. Overhaul and improvement of crew quarters on USNS Twin Falls. Military Sea Transportation Service, Atlantic. N00033–66–C–0020.

25—**LTV Aerospace Corp.**, Dallas, Texas. $2,808,076 (contract modification). Incorporation of improvement changes on RF–8A aircraft. Naval Air Systems Command. N00019–68–C–0130.

—**United Aircraft Corp.**, East Hartford, Conn. $2,381,022. Spare parts for TS–30P8 and J52P8A/P6A engines. Aviation Supply Office, Philadelphia, Pa. N00383–9–69000A–AG252.

—**North American Rockwell Corp.**, Anaheim, Calif. $1,529,663. Design, manufacture and acceptance testing, plus documentation and field services, for Search Set Sub-Systems of the Target Designator System. Naval Purchasing Office, Los Angeles, Calif. N00123–69–C–0507.

27—**Austin-Wright Construction Co.**, Oklahoma City, Okla. $1,375,000. Rehabilitation of Bachelor Officers' Quarters and Mess, Marine Corps Air Station, Cherry Point, N.C. Naval Facilities Engineering Command, through Atlantic Division, Norfolk, Va. N62470–68–C–0049.

—**Liles Construction Co., Inc.**, Montgomery, Ala. $1,158,963. Alterations to family housing units, Naval Station, Key West, Fla. Naval Facilities Engineering Command, through Southeast Division, Charleston, S.C. N62467–67–C–0186.

—**Remcor Inc.**, Williamstown, N.J. $1,074,600. Heads for 5-inch spin-stabilized rockets. Ships Parts Control Center, Mechanicsburg, Pa. N00104–69–C–0307.

28—**Collins Radio Corp.**, Cedar Rapids, Iowa. $3,201,632. Buoy sub-systems, test sets and support services for Project SECT. Naval Ordnance Laboratory, White Oak, Md. N60921–69–C–0121.

—**Sparton Corp.**, Jackson, Mich. $3,137,800. AN/SSQ–41A sonobuoys. Naval Air Systems Command. N00019–69–C–0495.

—**Bendix Corp.**, Mishawaka, Ind. $1,325,000. Talos missile UHF telemetering and field conversion rework kits. Naval Ordnance Systems Command. N00017–69–C–0495.

—**Sanders Associates, Inc.**, Nashua, N.H. $1,223,606. Development and operation of special radar simulation facilities for test and evaluation of ECM systems. Naval Air Systems Command. N00019–69–C–0329.

—**United Aircraft Corp.**, Norwalk, Conn. $1,881,289. Components for radar systems in A–6A and EA–6A aircraft. Navy Aviation Supply Office, Philadelphia, Pa. N00383–67–A5506–0451.

—**Hughes Aircraft Co.**, Fullerton, Calif. $2,625,000. Modernization of AN/SPS–33 radar equipment. Naval Ship Systems Command. N00024–69–C–1244.

—**General Electric Co.**, Washington, D.C. $1,189,000. Nuclear machinery propulsion components. Fitchburg, Mass. Naval Ship Systems Command. N00024–69–C–5417.

—**Sperry Rand Corp.**, St. Paul, Minn. $1,189,310. Design, development and fabrication of pre-production model computer component for Naval Tactical Data System. Naval Ships System Command. N00024–69–C–1245.

DEPARTMENT OF THE AIR FORCE

3—**Litton Systems**, Woodland Hills, Calif. $2,199,900. Gyroscope component of the inertial navigation system for F–4 aircraft. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla. F04606–68–A–0147.

—**TRW, Inc.**, Redondo Beach, Calif. $14,000,000. Design of satellites and dispensers. Space & Missile Systems Organization, (AFSC), Los Angeles, Calif.

4—**Olin Mathieson Chemical Corp.**, East Alton, Ill. $1,111,264. Production of engine starter cartridges applicable to B–57 aircraft. Marion, Ill. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah. F42600–69–C–2571.

5—**Hunt Building Marts**, El Paso, Tex. $4,469,640. Construction of 300 family housing units at Holloman AFB, N.M. Holloman AFB, N.M. F29651–69–C–0265.

—**Bendix Corp.**, Teterboro, N.J. $1,600,000. Procurement of components applicable to modification of B–52 aircraft. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla. F09603–69–A–0038.

—**Sargent Fletcher Co.**, El Monte, Calif. $1,501,402 (contract modification). Production of external fuel tanks for F–5 aircraft. Aeronautical Systems. Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–67–C–1339–P006.

—**Melpar, Inc.**, Falls Church, Va. $1,002,976. Modification kits for ground communication equipment. Oklahoma City Air Materiel Area, (AFLC), Okla. F09603–68–A02–62–SD02.

6—**Ets-Hokin & Galvan Corp.**, San Diego, Calif. $1,606,158. Design and fabrication of a bare base electrical distribution system. Aeronautical Systems Div., (AFSC). Wright-Patterson AFB, Ohio. F33657–69–C–0784.

7—**General Electric**, Cincinnati, Ohio. $51,841,500. Production of J–79 turbojet engines for F–4E aircraft. Evendale, Ohio. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–68–C–1232–P002.

—**FWD Corp.**, Clintonville, Wis. $4,114,653. Production of 24 fire fighting trucks. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga. F09603–69–C–0074.

10—**General Motors**, Goleta, Calif. $1,225,000. Research in hypervelocity speed range. Space & Missile Systems Organization, (AFSC), Los Angeles, Calif. F04701–69–C–0125 PZ01.

—**Burroughs Corp.**, Paoli, Pa. $1,060,589. Production of modification kits for teletype equipment. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass. F19628–69–C–0224.

12—**Pioneer Parachute Co.**, Manchester, Conn. $1,294,820. Production of drag parachute assemblies for mid-air retrieval systems. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif. F04606–69–C–0568.

—**North American Rockwell Corp.**, Columbus, Ohio. $7,000,000. Guided bomb kits, spare parts and aerospace ground equipment and data. Aeronautical Systems Division (AFSC), Wright-Patterson AFB, Ohio. F33657–69–C–0400.

13—**Goodyear Aerospace Corp.**, Akron, Ohio. $2,994,650. Design, fabrication and testing of personnel shelters. Aeronautical Systems Division, (AFSC). F33657–69–C–0773.

14—**United Aircraft Corp.**, Hartford, Conn. $1,082,873. Component parts for J–57 aircraft engines. San Antonio Air Materiel Area (AFLC), Kelly AFB, Tex. N383–6900A SA 69–1221.

—**Oshkosh Truck Corp.**, Oshkosh, Wis. $1,692,445. 112 snow removal vehicles. Warner Robins Air Materiel Area (AFLC), Robins AFB, Ga. F09603–69–D–0002–0002.

—**Cullman Metalcraft Inc.**, Cullman, Ala. $3,397,244. Production of bomb components. Armament Development and Test Center, (AFSC), Eglin AFB, Fla. F08635–69–C–0032.

—**Camden Mfg. Co. Division of Batesville Mfg. Co.** Camden, Ark. $3,456,000. Bomb components. Armament Development and test Center, (AFSC). F08635–69–C–0033.

—**Litton Industries, Inc.**, San Carlos, Calif. $1,056,000. Production of electron tubes. Warner Robins AMA, (AFLC). F09603–69–C–3176.

—**Hensel-Phelps Construction Co.,** and **Hensel-Tointon Constructors, Inc.**, Greeley, Col. $1,879,000. Construction of munitions handling and storage building. Grand Forks AFB, N.D. Army Corps of Engineer Ballistic Missile Construction Office. Los Angeles, Calif. DACA 13–69–C–0005.

17—**IBM**, Washington, D.C. $1.768,402. Special test equipment for Minuteman III guidance and control systems. San Jose, Calif. Space and Missile Systems Organization, Los Angeles, Calif. F04701–69–C–0130.

19—**Honeywell, Inc.**, St. Petersburg, Fla. $5,200,000. Production of electronic equipment applicable to Minuteman. Space and Missile Systems Organization, (AFSC). Los Angeles, Calif. F04701–63–C–0187.

—**REDM Corp.**. Wayne, N.J. $1,662,873. Production of components for general purpose bombs. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah. F42600–69–C–2986.

—**Continental Aviation and Engineering Corp.**, Detroit, Mich. $1,011,574. Field service tests and maintenance support for J–69 series engines. Aeronautical Systems Division. (AFSC) Wright-Patterson AFB, Ohio. F33657–69–C–0449.

20—**United Technology Center**, Sunnyvale, Calif. Definization of previously awarded letter contract. $46,035,000 previously awarded (no money awarded on this date). Development of seven-segment solid rocket motors for Titan IIIM Manned Orbiting Laboratory (MOL) launch vehicles. Manned Orbiting Laboratory, Systems Office, (AFSC), Los Angeles, Calif. AF 04/695/-1022.

21—**McDonnell Douglas Corp.**, St. Louis, Mo. $1,651,600. Modification of F–4C aircraft. Robertson, Mo. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah. F34601–68–A–2919.

24—**Continental Aviation and Engineering Corp.**, Detroit, Mich. $2,000,000. YJ–69–T–400 engines. Aeronautical Systems Division (AFSC), Wright-Patterson AFB, Ohio. F33657–69–C–0828.

27—**IBM Corp.**, Owego, N.Y. $7,000,000. Manufacture of components for improved B–52 bomb navigational system. Warner Robins Air Materiel Area (AFLC), Robins AFB, Ga. F09603–69–C–3096.

—**TRW, Inc.**, Redondo Beach, Calif. $2,192,400. Minuteman operational targeting verification and validation program. Space and Missile Systems Organization, (AFSC), Los Angeles, Calif. F04701–69–C–0121.

—**Itek Corp.**, Palo Alto, Calif. $1,289,000. Radar homing and warning systems for various aircraft. Sunnyvale, Calif. Warner Robins Air Materiel Area (AFLC), Robins AFB, Ga. F04606–69–A–0141.

28—**Avco Corp.**, Stratford, Conn. $5,357,590. Production of ballistic missile penetration aids. Space and Missile Systems Organization, AFSC, Los Angeles, Calif. F04701–68–C–0039.

—**Boeing Co.**, Wichita, Kansas. $7,200,000. Development of electrical optical viewing system for B–52. Oklahoma City Air Materiel Area, AFLC, Tinker AFB, Okla. F34601–69–C–2487.

—**Goodyear Tire and Rubber Co.**, Akron, Ohio. $1,200,069. Production of collapsible fuel tanks with 50,000 gallon capacity. Litchfield Park, Ariz. San Antonio Air Materiel Area. AFLC, Kelly AFB, Texas. F41608–69–C–8186.

Army Studies New Cargo Air-Drop System

A parawing system for silent and accurate air-drop of supplies, from as far as 12 miles away and 30,000 feet above the drop zone, is being studied by mobility planners of the U. S. Army Combat Developments Command (CDC), Fort Belvoir, Va.

Under consideration for Army-wide adoption, the parawing can be deployed from current military cargo aircraft. It is designed to operate when combat conditions require military aircraft to keep well out of enemy sight and hearing. This delivery method may be used also where terrain makes conventional air-drop procedures difficult. After ejection from aircraft, a radio control unit guides the parawing and payload to "home in" to a selected impact point on the ground. If required, the flight path can be changed during descent by an operator on the ground.

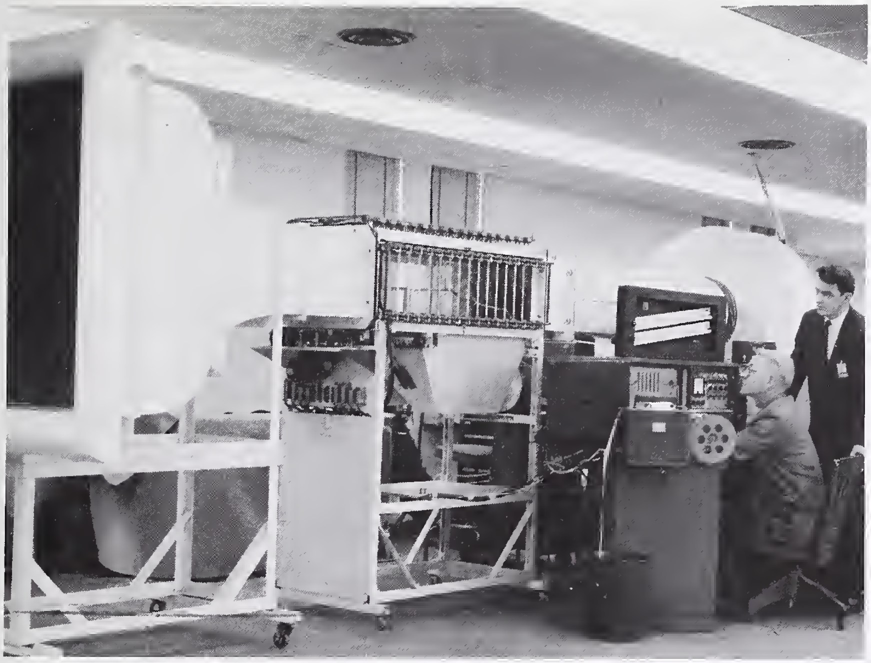
Fifteen of the steerable gliders have been produced for the Army Aviation Materiel Laboratories, Fort Eustis, Va. Mobility experts have identified the user's requirements, performance characteristics, and are closely monitoring development of the controlled air-drop system.

The system's radio control unit was developed by Ryan Aeronautical Co. Goodyear Aerospace developed the parawing which is now undergoing engineer testing.

Cooling Unit Type Classified for Production

An 18,000 BTU/Hr trailer-mounted air conditioner, designed to cool complex mobile electronic systems in combat conditions, has been type classified by the Army for limited production.

Developed by the U. S. Army Mobility Equipment Research and Development Center, Fort Belvoir, Va., it employs such Military Standard items as the 18,000 BTU/Hr multi-pack air conditioner and the 5 KW gasoline engine driven generator mounted on a ¾-ton trailer. The air conditioner uses Refrigerant-12 as a coolant.



Computer-controlled louvres direct air into and out of test section of experimental wind tunnel at Arnold Engineering Development Center.

Air Force Tries New Ideas in V/STOL Wind Tunnel

The Air Force Systems Command's Arnold Engineering Development Center, Tullahoma, Tenn., is conducting research that may lead to significant improvements in wind tunnels for testing vertical and short takeoff and landing (V/STOL) aircraft.

The new wind tunnel design contains venetian blind-like louvres rather than conventional smooth or perforated walls in the test section. The louvres are controlled by a computor which manipulates them to direct the air through the test section, creating an air flow pattern like that of the lift engines of a V/STOL inflight.

In the solid and perforated wall tunnels, the downwash from the lift engines is reflected from the walls to the model, precluding valid simulation of actual flight environments. Work is now aimed at determining if the "streamline matching" is accurate enough to warrant incorporation of the idea into operational wind tunnels.

Development of the louvred-wall tunnel was directed after a computer-aided analysis of the complex airflows generated by V/STOL craft.

Navy Tests New Lightweight 5-Inch Gun

The Navy has successfully completed initial shipboard tests of the lightest mid-caliber automatic gun ever constructed by the United States.

The gun, to be installed on most of the Navy's new warships, is being evaluated on the ordnance test ship USS Norton Sound. Known as the Mark 45, the new rapid-fire 5-inch 54-caliber weapon reflects the Navy's renewed emphasis on improved conventional ordnance to meet present and future needs.

Under development since 1964, the Mark 45 weighs only one-third as much as present 5-inch 54-caliber guns and needs of a crew of only 6 men, compared to the 16 currently required.

The gun's unusual lightness—less than 50,000 pounds—stems from simplicity of design in the gun mount's silhouette and operating parts, and the use of aluminum and special lightweight steel in the gun's construction.

A unique feature of the Mark 45 is that the gun crew need not enter the gun mount. The gun can be loaded, controlled and fired from remote positions below decks.

Developed by the Navy's Ordnance System Command, the Mark 45's automated characteristics reflect the presence of numerous solid state circuits. A remote control light panel provides a continuous display of the status of the gun's various components.

Performance of the Mark 45 has exceeded expectations throughout the gun's development. Firing tests to date have demonstrated a high degree of accuracy and reliability.

The Mark 45 can fire 20 projectiles per minute at air and surface targets more than 10 miles away. The gun was designed to accommodate all existing types of 5-inch 54-caliber ammunition, as well as the long-range rocket-assisted projectiles just developed by the Navy.

Delivery of the guns to the Fleet will begin next year or early 1971.

F–15 Logistic Management to Warner-Robins AMA

Responsibility for logistic management of the new F–15 advanced tactical fighter has been assigned to the Air Force Logistics Command's Warner Robins Air Material Area, Robins AFB, Ga. The assignment will include item management and specialized repair activity.

Immediate impact of the assignment is not expected to be great, but it is being made at this time to assure that all support functions are exploited during the design and development phases of the aircraft's systems.

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Air Force Works on Miniature Pilot TV Target Display

A combination of a remotely controlled TV camera and display screen, which will allow a pilot to more easily detect and strike targets on the ground, is being developed in a joint Air Force-Navy program.

Development of the electro-optical device, called an airborne helmet-mounted display, is being managed by the Air Force Systems Command's Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio.

The display screen, coupled to a television camera mounted on the aircraft, will enable the pilot to see beyond aircraft structures that otherwise obscure his vision. Electronic sensors, developed by Honeywell, Inc., Minneapolis, Minn., are built into the side of the helmet to move the camera in the same direction the pilot is looking.

The helmet-mounted display projects a half-dollar size viewing screen 18 inches in front of the pilot's right or left eye, depending on which side of the helmet the display is mounted. The screen image is then magnified through optics in the device.

The pilot is not required to adjust his vision between the cockpit display and the outside world, because he sees the image at the same depth of field as if he were looking outside the aircraft.

The display also shows air speed, altitude and other information, making it unnecessary for the pilot to take his eyes off target to check the instruments. The large screen display permits the image to be presented at a scale which aids target identification, location and acquisition. It also prevents interference from bright sunlight and is designed to "see" even when the pilot cannot.

Built by Hughes Aircraft Co., Culver City, Calif., the one-pound display consists of a one-inch cathode ray tube, projection optics and connecting electrical cables. The unit can be detached by the pilot in case of emergency.

Initial tests are being conducted by the Aerospace Medical Research Laboratories.

AF Logistics Command Realigns Jet Engine Management

The Air Force Logistic Command is realigning jet engine management responsibilities between two of its air materiel areas.

The shift is between Oklahoma City Air Materiel Area (OCAMA), Tinker AFB, Okla., and San Antonio Air Materiel Area (SAAMA), Kelly AFB, Tex.

The switch was made, according to the Air Force Logistics Command, to be more responsive to customer requirements and to obtain better control by joining management and repair activity under the same area commander.

Under the shift J–75, J–57 and TF–33 engine management will be transferred from SAAMA to OCAMA. Responsibility for the T–56, J–85 and gas turbine engines will go from OCAMA to SAAMA.

These engines power most of the Air Force's first line aircraft. The gas turbines are used primarily as ground power units and auxiliary aircraft engines.

The transfer is to be completed by June 30, 1969.

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